

AUTODESK REVIT

(ELECTRICAL)

-FAMILY CREATION-

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REVIT ELECTRICAL (FAMILY CREATION)

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1. INTRODUCTION TO REVIT FAMILY

Revit Families

A family is a group of elements with a common set of properties, called parameters, and a related graphical representation.

Different elements belonging to a family may have different values for some or all of their parameters, but the set of parameters (their names and meanings) is the same. These variations within the family are called *family types* or *types*.

Although these families serve different purposes and are composed of different materials, they have a related use. Each type in the family has a related graphical representation and an identical set of parameters, called the family type parameters.

When you create an element in a project with a specific family and family type, you create an *instance* of the element. Each element instance has a set of properties, in which you can change some element parameters independent of the family type parameters. These changes apply only to the instance of the element, the single element in the project. If you make any changes to the family type parameters, the changes apply to all element instances that you created with that type.

The 3 kinds of families in Revit are: **system families**, **loadable families**, and **in-place families**.

- ❖ Most elements that you create in your projects are system families or loadable families. Loadable families can be combined to create nested and shared families. Non-standard or custom elements are created using in-place families.

System Families

System families create basic elements that you would assemble on a construction site.

Examples:

- a. Walls, roofs, floors
- b. Ducts, pipes
- c. Cable tray, conduit

System settings, which affect the project environment and include types for levels, grids, drawing sheets, and viewports, are also system families.

System families are predefined in Revit. You do not load them into your projects from external files, nor do you save them in locations external to the project.

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Loadable Families

Loadable families are families used to create the following:

- Building components that would usually be purchased, delivered, and installed in and around a building, such as windows, doors, casework, fixtures, furniture, and planting
- System components that would usually be purchased, delivered, and installed in and around a building, such as boilers, water heaters, air handlers, and plumbing fixtures
- Some annotation elements that are routinely customized, such as symbols and title blocks

Because of their highly customizable nature, loadable families are the families that you most commonly create and modify in Revit. Unlike system families, loadable families are created in external RFA files and imported, or loaded, in your projects. For loadable families that contain many types, you can create and use type catalogs, which allow you load only the types that you need for a project.

In-Place Families

In-place elements are unique elements that you create when you need to create a unique component that is specific to the current project. You can create in-place geometry so that it references other project geometry, resizing or adjusting accordingly if the referenced geometry changes. When you create an in-place element, Revit creates a family for the in-place element, which contains a single family type.

Creating an in-place element involves many of the same Family Editor tools as creating a loadable family.

1.1. Element Behavior in Revit

Revit uses 3 types of elements in projects: model elements, datum elements, and view-specific elements. Elements in Revit are also referred to as families. The family contains the geometric definition of the element and the parameters used by the element. Each instance of an element is defined and controlled by the family.

Model elements represent the actual 3D geometry of the building. They display in relevant views of the model.

Examples:

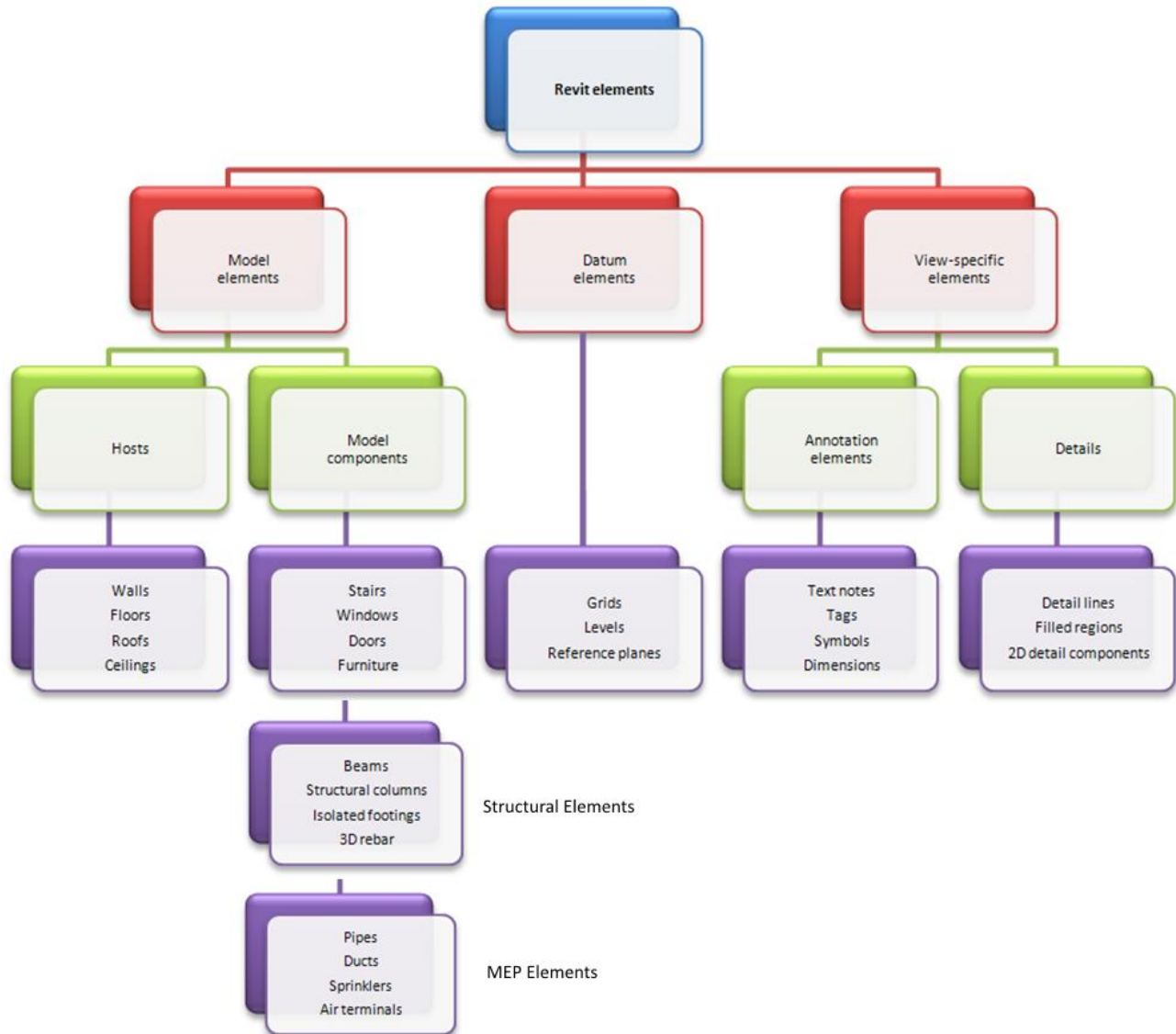
- a. Walls, windows, doors, and roofs
- b. Structural walls, slabs, and ramps
- c. Sinks, boilers, ducts, sprinklers, and electrical panels

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Datum elements help to define project context. For example, grids, levels, and reference planes are datum elements.

View-specific elements display only in the views in which they are placed. They help to describe or document the model. For example, dimensions are view-specific elements.

Elements for Revit



1.2. Element Properties

Each element you place in a drawing is an instance of a family type. Elements have 2 sets of properties that control their appearance and behavior: type properties and instance properties.

1.2.1. Type Properties

The same set of type properties is common to all elements in a family, and each property has the same value for all instances of a particular family type.

For example, all elements that belong to the Desk family have a Width property, but its value varies according to family type. Thus every instance of the 60 x 30-inch family type (1525 x 762 mm) within the Desk family has a Width value of 60 inches (1525 mm), while every instance of the 72 x 36-inch family type (1830 x 915 mm) has a Width value of 72 inches (1830 mm).

Changing the value of a type property affects all current and future instances of that family type.

1.2.2. Instance Properties

A common set of instance properties also applies to all elements that belong to a particular family type, but the values of these properties may vary according to the location of an element in a building or project.

For example, the dimensions of a window are type properties, while its elevation from the level is an instance property. Similarly, cross-sectional dimensions of a beam are type properties, while beam length is an instance property.

Changing the value of an instance property affects only the elements in your selection set, or the element that you are about to place. For example, if you select a beam, and change one of its instance property values on the Properties palette, only that beam is affected. If you select a tool for placing beams, and change one of its instance property values, the new value applies to all beams you place with that tool.

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1.3. Categories for Revit Electrical Families

The family category specified when a family is created determines which family parameters are activated. The settings for these family parameters affect the behavior for the part and identifies the type of component. In the Family Editor, the Family Category and Parameters settings are found in the Settings menu. Depending on the family category and the type of template that the family was derived from (host-based, generic model, detail component, generic tag, and so on), different family parameters apply.

Family Category	Family Parameter					
	Work Plane Based	Always Vertical	Light Source	Part Type	Maintain Annotation Orientation	Shared
Cable Tray Fittings	X	X		X		
Communications Devices	X	X		X	X	X
Conduit Fittings	X	X		X		
Data Devices	X	X		X	X	X
Electrical Equipment	X	X		X		X
Electrical Fixtures	X	X		X	X	X
Fire Alarm Devices	X	X		X	X	X
Generic Models	X	X				X
Lighting Devices	X	X		X	X	X
Lighting Fixtures	X	X	X	X		X
Nurse Call Devices	X	X		X		X
Security Devices	X	X		X	X	X
Telephone Devices	X	X		X	X	X

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About Parameters

You can create custom parameters for a project, and for any element or component category in the project.

Parameters that you create display in the Properties palette or Type Properties dialog under the group you define and with the values you define.

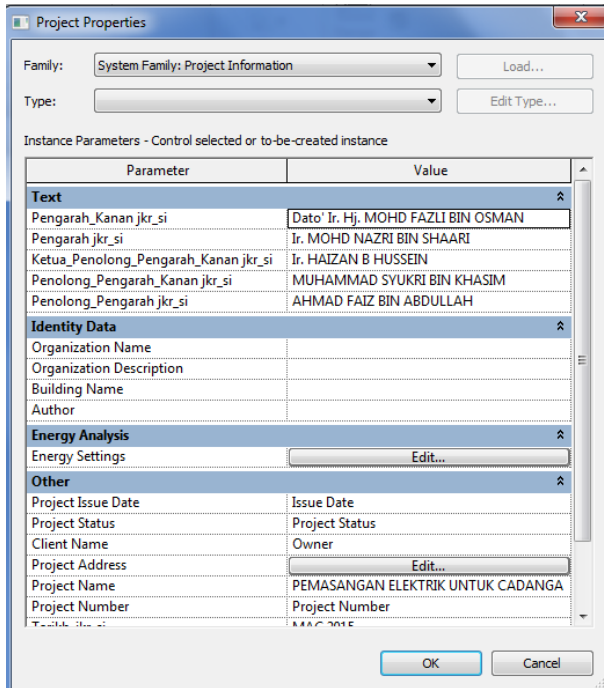
Refer to the following table for descriptions of the 3 types of custom parameters.

Parameter Type	Description	Examples
Project Parameters	Project parameters are specific to a single project file. They are added to elements by assigning them to multiple categories of elements, sheets, or views. Information stored in project parameters cannot be shared with other projects. Project parameters are used for scheduling, sorting, and filtering in a project.	A project parameter can be used to categorize views within a project.
Family Parameters	Family parameters control variable values of the family, such as dimensions or materials. They are specific to the family. A family parameter can also be used to control a parameter in a nested family by associating the parameter in the host family to the parameter in the nested family.	Family parameters such as Width and Height may be used in a Door family to control the dimensions of the different door types.
Shared Parameters	Shared parameters are parameter definitions that can be used in multiple families or projects. After you add a shared parameter definition to a family or project, you can use it as a family or project parameter. Because the definition of a shared parameter is stored in a separate file (not in the project or family), it is protected from change. For this reason, shared parameters can be tagged and scheduled.	If a parameter in a family or project needs to be scheduled or tagged, that parameter must be shared and loaded in both the project (or element family) and the tag family. Shared parameters can be used when elements in 2 different families are scheduled together. For example, if you need to create 2 different Isolated Foundation families, and need the Thickness parameter of both families scheduled in the same column, Thickness needs to be a shared parameter that is loaded in both Isolated Foundation families.

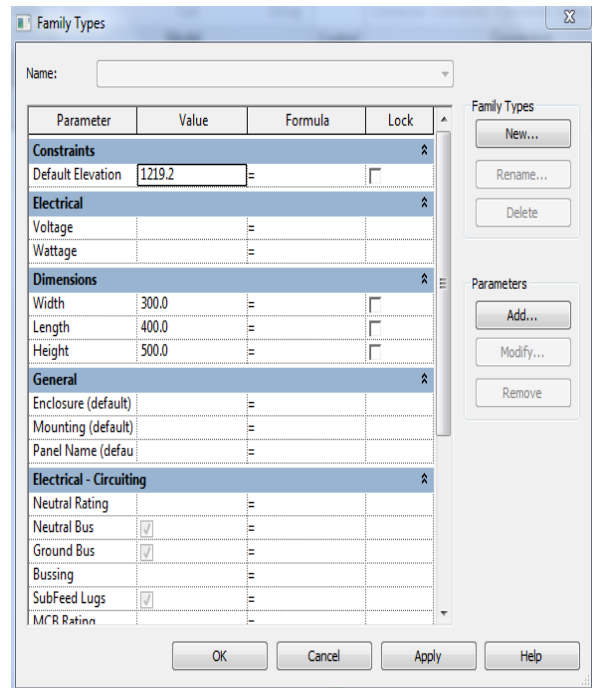
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Example parameter type as shown below.

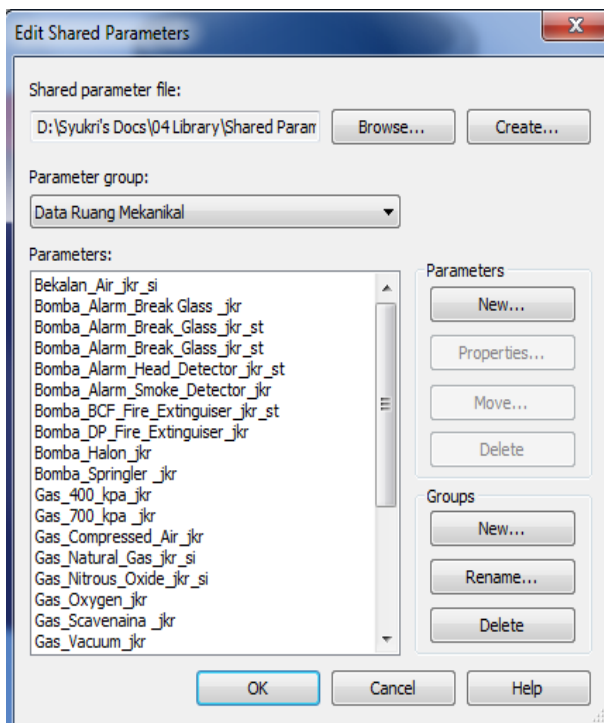
Project Parameters



Family Parameters



Shared Parameters

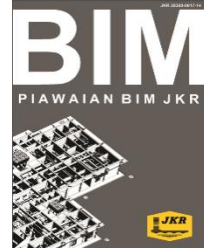


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1.4. Family Naming Convention - Piawaian BIM JKR

Component Family

Example:



1.4.1. Lighting

No.	Nome Component Family	1	2	3	4	5	6	7	8	9	Description in Legend
	Fluorescent Lighting	Discipline	Sub-Discipline	Family Category	Lod	Lamp Type	Mounting	Fitting Type	Wattage	Supply Type	
1	jkrEL15_LV_lit-fix-3_fluo_r_alpr_2x36W_N	jkrEL15	LV	lit-fix	-3	fluo	r	alpr	2X36W	N	2 x 36W Fluorescent Recessed Luminaire c/w Aluminium Louvred And Parabolic Polished Aluminium Reflector (normal supply).
2	jkrEL15_LV_lit-fix-3_fluo_s_alpr_2x36W_E	jkrEL15	LV	lit-fix	-3	fluo	s	alpr	2X36W	E	2 x 36W Fluorescent Surfaced Luminaire c/w Aluminium Louvred And Parabolic Polished Aluminium Reflector (essential supply).

Abbreviations (keys only): fluo = fluorescent; r = recessed; s = surfaced; alpr = aluminium louvred and parabolic polished aluminium reflector; N = normal; E = essential.

1.4.2. Switch Socket Outlet

No.	Nome Component Family	1	2	3	4	5	6	7	8	9	Description in Legend
	Soket Alir Kuasa	Discipline	Sub-Discipline	Family Category	Lod	Soket Type	Mounting	Rating	Supply Type	Function	
1	jkrEL15_LV_ele-fix-3_2g_f300_13A_N	jkrEL15	LV	ele-fix	-3	2g	f300	13A	N		2 Gang 13A 3 Pin Flushed Switched Socket Outlet - (300mm above floor level - normal supply)
2	jkrEL15_LV_ele-fix-3_2g-wp_s300_13A_E	jkrEL15	LV	ele-fix	-3	2g-wp	s300	13A	E		2 Gang 13A 3 Pin Surfaced Weather Proof Switched Socket Outlet - (300mm above floor level - essential supply)
3	jkrEL15_LV_ele-fix-3_2g-mc_s300_13A_N	jkrEL15	LV	ele-fix	-3	2g-mc	s300	13A	N		2 Gang 13A 3 Pin Surfaced Metal Clad Switched Socket Outlet - (300mm above floor level - normal supply)
4	jkrEL15_LV_ele-fix-3_2g_s300ac_15A_N_AC	jkrEL15	LV	ele-fix	-3	1g	s300ac	15A	E	AC	15A 3 Pin Surfaced Socket Outlet - (300mm above ceiling level - essential supply - aircond)
5	jkrEL15_LV_ele-fix-3_2G_S300C_13A_N_TV	jkrEL15	LV	ele-fix	-3	2g	f300bc	13A	N	TV	2 Gang 13A 3 Pin Flushed Switched Socket Outlet - (300mm below ceiling level - normal supply - TV)

2g = 2 gang; 1g = 1 gang; wp = weather proof; mc = metal clad; N = normal supply; E = essential supply; AC = aircond; TV = television;
 f300 = flushed at 300mm above floor level;
 s300 = surfaced at 300mm above floor level;
 s300ac = surfaced at 300mm above ceiling level;
 f300bc = flushed at 300mm below ceiling level.

Abbreviations (keys only):

1.4.3. Isolator

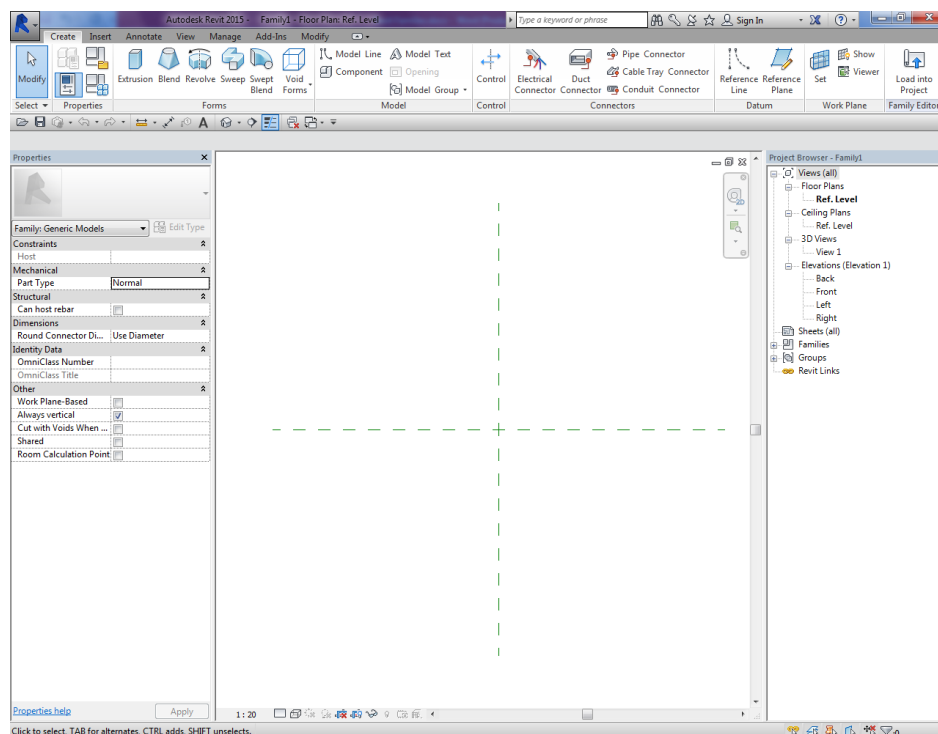
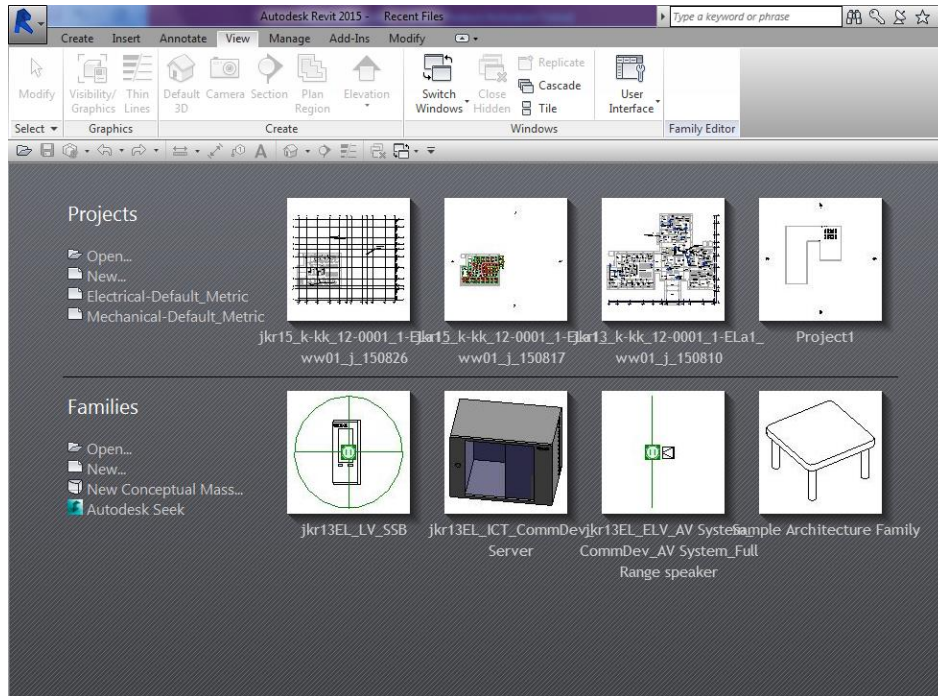
No.	Nome Component Family	1	2	3	4	5	6	7	Description in Legend
	Isolator	Discipline	Sub-Discipline	Family Category	Lod	Isolator Type	Rating	Supply Type	
1	jkrEL15_LV_ele-fix-3_2P-wp_20A_N	jkrEL15	LV	ele-fix	-3	2P-wp	20A	N	20A 2 Pole Weather Proof Isolator - (normal supply).
2	jkrEL15_LV_ele-fix-3_4P_32A_E	jkrEL15	LV	ele-fix	-3	4P	32A	E	32A 4 Pole Isolator - (essential supply).
3	jkrEL15_LV_ele-fix-3_3P-mc_63A_N	jkrEL15	LV	ele-fix	-3	3P-mc	63A	N	63A 3 Pole Metal Clad Isolator - (normal supply).
4									

2P = 2 pole; 4P = 4 pole; 3P = 3 pole;
 wp = weather proof; mc = metal clad;
 N = normal supply; E = essential supply.

Abbreviations (keys only):

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2.0 FAMILIARIZATION WITH TOOLS FOR CREATING ELECTRICAL FAMILIES.





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Using Standard/Default Family Template

New Revit MEP Projects are based on template file. The options for creating a new file by selecting the **New** command in the Application Menu or Quick Access Toolbar.

a. Start a New Project from the Application Menu

1. In the Application Menu expand  (New) and click  (Project), as shown in Figure 2.1.

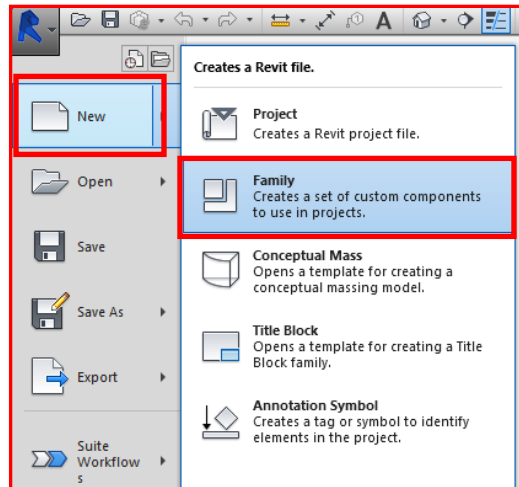
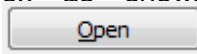
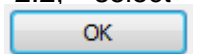


Figure 2.1

2. In the New Project dialog box, select the template you want to use (by clicking the **Browse** button and navigating to and selecting the required template).
3. In the choose template dialog box as shown in Figure 2.2, select the **Metric_Generic_Model** template, click  and then click .

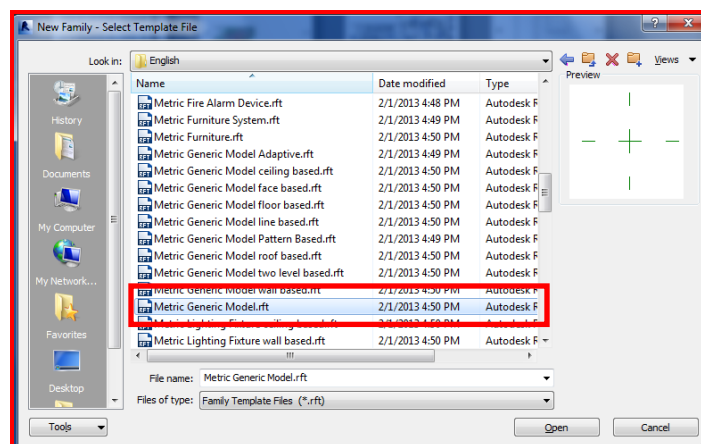


Figure 2.2

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4. The views available in the project browser. (Default template) the templates that are installed with the Revit MEP software include some standards views, families, etc. for specific types of projects as shown in Figure 2.3.

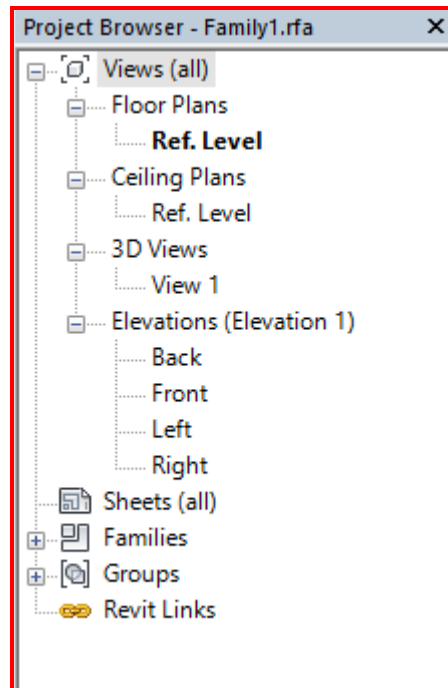




Figure 2.3

b. Start a New Project from the Quick Access Toolbar

1. In the Quick Access Toolbar, click  (New).
2. A new project is created based on the default template.
3. By default, the **New** button is not available in the Quick Access Toolbar. At the end of the Quick Access Toolbar, click  (Customize Quick Access Toolbar) and select **New**, as shown in Figure 2.4.

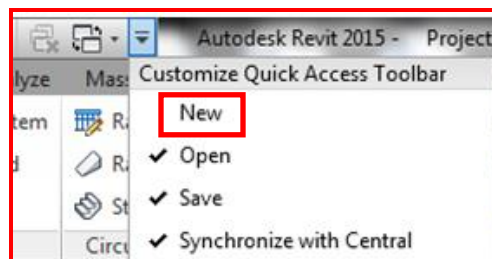


Figure 2.4

2.1 Creating Component Families

2.1.1 Reference planes

Reference planes are used to define relationships among the geometric components within the Family Editor. Reference planes are not displayed when a family is used in a building model, unless a defined relationship between a reference plane and geometry exists.

2.1.2 Template Properties

Family templates are present grouping of parameter and views aid in the creation of system-specific families. After select a template, Revit MEP starts the Family Editor and opens the commonly used views for that family creation. The template includes common references that are required to create a family. The family template files are available in the **Metric Templates** folder.

There are 6 types of family templates in Revit that are: **wall-based template, ceiling-based template, floor-based template, roof-based template, non-hosted template** and **face-based template**.

i. Wall-based template

The wall-based template is used for components inserted into walls. Wall components can include opening so that when place the component on the wall, it also cuts an opening in the wall. Some examples of wall-based components include doors, windows and lighting fixtures.

ii. Ceiling-based template

The ceiling-based template is used for components inserted into ceilings. Ceiling components can include openings so that when place the component on a ceiling, it also cuts an opening in the ceiling. Examples of ceiling-based families include recessed lighting fixtures, ceiling speakers and security devices.

iii. Floor-based template

The floor based template is used for components inserted into floors. Floor components can include openings so that when place the component on a floor, it also cuts an opening in the floor. An example of a floor-based family is under floor trunking system which is service box.

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iv. Roof-based template

The roof-based template is used for components inserted into roofs. Roof components can include openings so that when place the component on the roof, it also cuts an opening in the roof. Example of roof-based family includes fans.

v. Non-hosted template

The non-hosted template is used for components that are not host dependent. A non-hosted component can appear anywhere in a model and can be dimensioned to other non-hosted or host-based components. Example of non-hosted families includes metering switchboard.

vi. Face-hosted template

The face-based template is used for creating workplace-based families that can modify their hosts. Families created from the template can make complex cuts in hosts.

2.1.3 Connectors

Connectors are an important part of Revit MEP because they allow data to flow between elements. The discipline assigned to a connector determines the types of systems with which it can interact and how it interacts with the other system components as shown in Figure 2.5.

i. Electrical connectors

Electrical connectors are used for any type of electrical connections, including power, telephone, alarm systems, and others. These connectors are used for any type of electrical connections within a building. Electrical connectors are considered to be logical connectors rather than physical connectors.

ii. Conduit connector

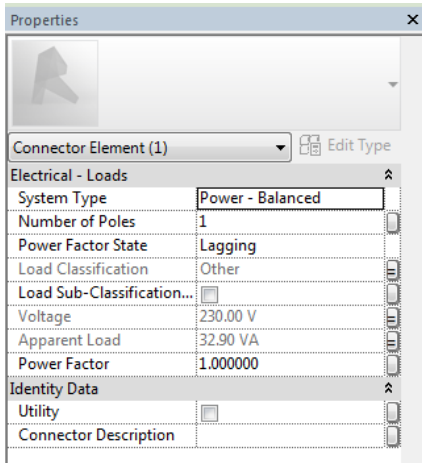
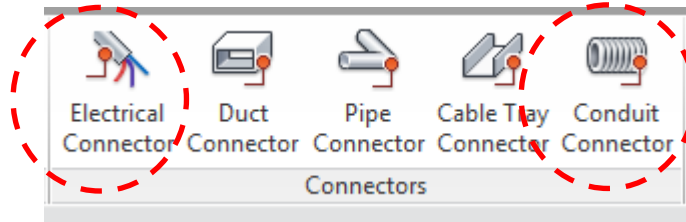
Conduit connectors are used for conduit, conduit fittings, and other components that are meant for wiring. A conduit connector can be an individual connector or a surface connector. The individual connector is used for connecting only one conduit. The surface connector is used for connecting more than one conduit to a surface.

iii. Cable tray connector

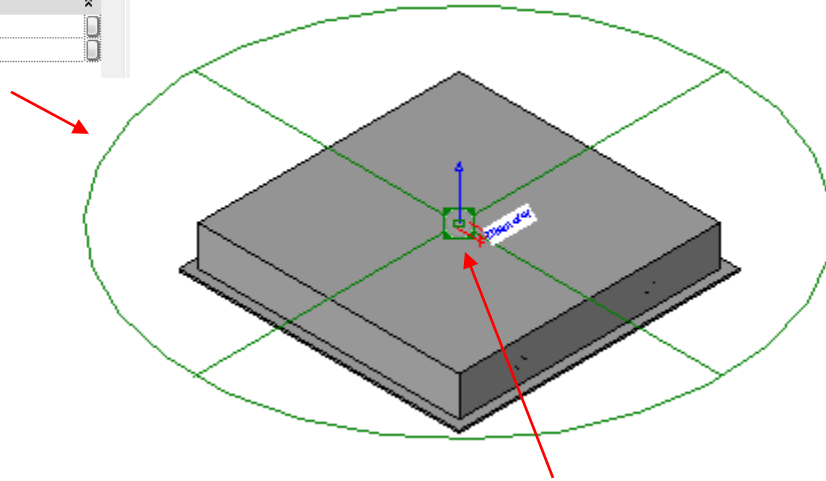
Cable tray connectors are used for cable tray, cable tray fittings, and other components that are meant for wiring.

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Example Electrical & Conduit Connectors



Electrical Connector



Conduit Connector

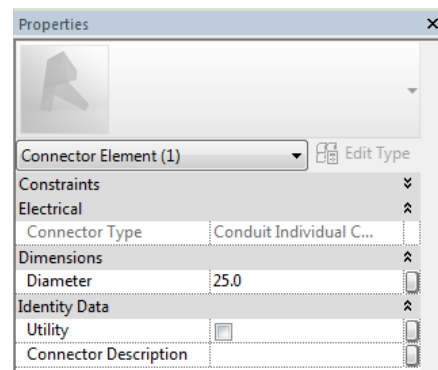


Figure 2.5

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Options for placing connectors

There are 2 options placing connectors in Revit that are: Place on Face and Place on Work Plane.

i. Place on Face

This option maintains a point at the center of the extrusion. Typically, the Place on Face is easier to use and it is suitable for most cases. Using this option, specify a plane and use dimensions to constrain the connector to the desired location.

ii. Place on Work Plane

This option allows placement of the connector on a selected plane. This option requires additional parameters and constraints to be used effectively.

2.1.4 Basic forming (geometry form)

The tools you use to create solid and void geometry are available in the Family Editor. The Family Editor is a graphical editing mode in Revit that allows you to create families to use in a model.



To create a family, you open a template in the Family Editor. The template can include multiple views, such as plan and elevation views. The Family Editor has the same look and feel as the project environment in Revit, but it features different tools located on a single Create tab.

The component family basic forming are Extrusion, Blend, Revolve, Sweep, Sweep Blend and Void.


a) Extrusion

Create a 3D solid by extruding a 2D profile. A solid or void extrusion is the easiest form to create. You sketch a 2D profile of the form on a work plane, and then extrude that profile perpendicular to the plane on which you sketched it.

To create a solid or void extrusion

1. Click Create tab ► Datum panel ► Reference Line (or Reference Plane), and sketch a line or reference plane.
2. Select the line or plane. Click Apply on the Properties palette.
3. In the Family Editor, on the Create tab ► Forms panel, do one of the following:
 - Click  (Extrusion) – solid form.
 - Click Void Forms drop-down ►  (Void Extrusion).

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Note: If necessary, set the **work plane** before you sketch the extrusion. Click Create tab ► Work Plane panel ►  (Set) as shown in Figure 2.6.

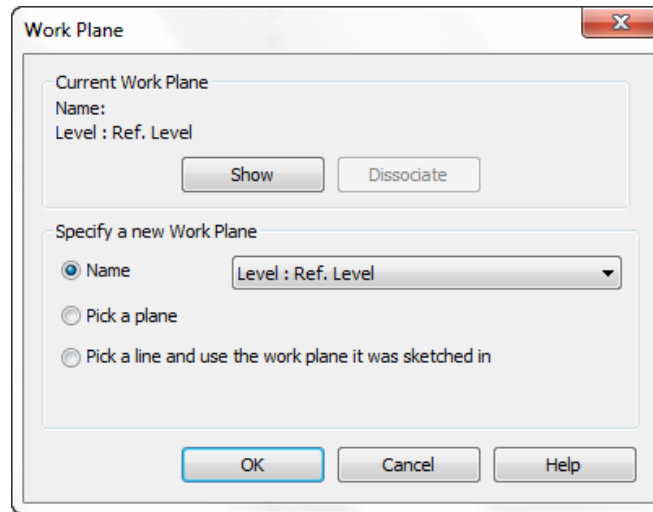


Figure 2.6

- Use the sketching tools or **Draw** tools to sketch the extrusion profile, for example sketch a square as shown in Figure 2.7:
 - To create a single solid form, sketch a closed loop.
 - To create more than one form, sketch multiple, non-intersecting, closed loops.

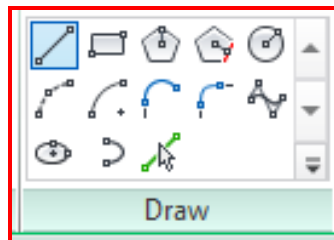



Figure 2.7




- Click Modify | Create Extrusion tab ► Mode panel ►  (Finish Edit Mode). Revit completes the extrusion and returns you to the view in which you started the extrusion.
- To view the extrusion, open a 3D view.
- To resize the extrusion in the 3D view, select it and use grips to edit it.

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Edit an Extrusion

You can modify the extrusion profile or change the extrusion properties. You can modify an extrusion after creating it.

To edit an extrusion

1. In the drawing area, select the extrusion.
2. If you are in the project environment:
 - a. Click Modify | <Element> tab ► Mode panel ►  (Edit Family).
 - b. In the Family Editor, select the extrusion in the drawing area again.
3. Click Modify | Extrusion tab ► Mode panel ►  (Edit Extrusion).
4. If desired, modify the extrusion profile.
5. On the Properties palette, change the visibility, material, or subcategory of the extrusion, if desired.
6. To change the extrusion to a solid or a void, under Identity Data, for Solid/Void, select Solid or Void.
8. Click Apply.
8. Click Modify | Edit Extrusion tab ► Mode panel ►  (Finish Edit Mode).

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b) Blend

Create a solid 3D shape that changes along its length, blending from a starting shape to an ending shape.

The Blend tool blends 2 profiles (boundaries) together. For example, if you sketch a large hexagon and a smaller circle on top of it, Revit blends the 2 shapes together. (A solid 3D shape is created that blends the sketches together) as shown in Figure 2.8.

Note: If you want to dimension a solid blend after you create it, you can dimension from lines at the top of the blend to lines at the base of the blend. You cannot dimension from lines at the base of the blend to lines at the top of the blend.

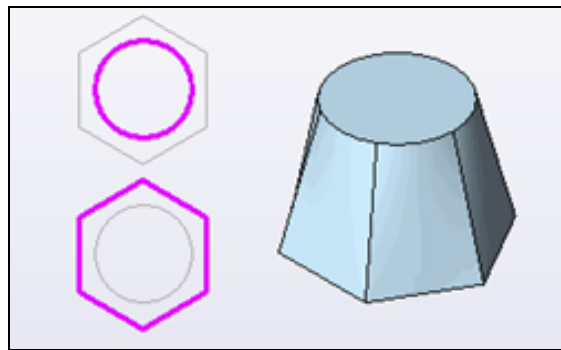





Figure 2.8

To create a solid or void blend

1. In the Family Editor, on the Create tab ► Forms panel, do one of the following:
 - Click  (Blend).
 - Click Void Forms drop-down ►  (Void Blend).

Note: If necessary, set the work plane before you sketch the blend. Click Create tab ► Work Plane panel ►  (Set).

2. On the Modify | Create Blend Base Boundary tab, use the **Draw** tools to sketch the base boundary of the blend, for example sketch a square as shown in Figure 2.9.

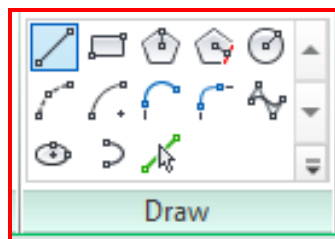




Figure 2.9

3. When finished with the base boundary, on the Modify | Create Blend Base Boundary tab ► Mode panel, click  (Edit Top).

REVIT ELECTRICAL (FAMILY CREATION)

4. On the Modify | Create Blend Top Boundary tab, sketch a boundary for the top of the blend, for example circle.
5. If necessary, edit the vertex connections to control the amount of twist in the blend:
 - On the Modify | Create Blend Top Boundary tab, click Mode panel  (Edit Vertices).
 - Vertex points become available on one of the blend sketches.

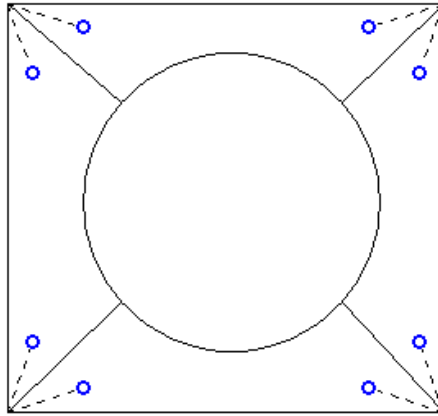





Figure 2.10

The dotted lines with blue open-dot controls are suggested connections. Each control is a switch between adding and removing connections as shown in Figure 2.10.

- To display the vertex points on the other blend sketch, on the Edit Vertices tab  Vertex Connect panel, click  (Controls on Base) or  (Controls on Top) - whichever option is currently unselected.
- Click a control, and the line becomes a solid connection. A filled blue control displays on the connection.

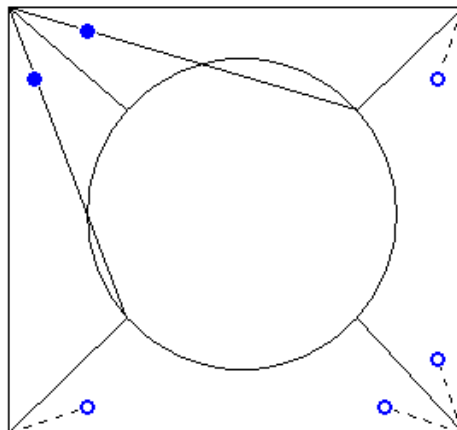










Figure 2.11

REVIT ELECTRICAL (FAMILY CREATION)

- Click a solid control to remove a connection; the line reverts to a dashed line with an open dot control as shown in Figure 2.11.
 - As you click the controls, some possible edges disappear and other ones appear.
 - On the Vertex Connect panel, click  (Twist Right) or  (Twist Left) to twist the selected blend boundary in a clockwise or counter-clockwise direction.
6. Click Modify | Create Blend Top Boundary > Mode panel >  (Finish Edit Mode).
 7. To view the blend, open a 3D view.
 8. To resize the blend in the 3D view, select and use grips to edit it.

Edit a Blend

You can change the depth value and modify the top and base of the blend.

1. In the drawing area, select the blend.
2. If you are in the project environment:
 - a. On the Modify | <Element> tab > Mode panel, click  (Edit Family).
 - b. In the Family Editor, select the blend in the drawing area again.
3. On the Options Bar, enter a value in the Depth text box to change depth of the blend.
4. On the Modify | Blend tab > Edit Blend panel, select an editing option:
 - Click  (Edit Top) to edit the top boundary of the blend.
 - Click  (Edit Base) to edit the base boundary of the blend.
5. On the Properties palette, change the visibility, material, or subcategory of the blend, as desired.
6. To change the blend to a solid or a void, under Identity Data, for Solid/Void, select Solid or Void.
7. Click Apply.
8. On the Modify | Edit Blend Top Boundary tab or Edit Blend Base Boundary tab, click Mode panel >  (Edit Vertices), and edit the blend vertices.
9. On the Mode panel, click  (Finish Edit Mode).

c) Revolve

Create a 3D shape by sweeping a 2D profile around an axis.

A revolve is a form that you create by revolving a shape around an axis. You can revolve the shape in a circle or any fraction of a circle. If the axis touches the revolve shape, the result is a solid as shown in Figure 2.12.

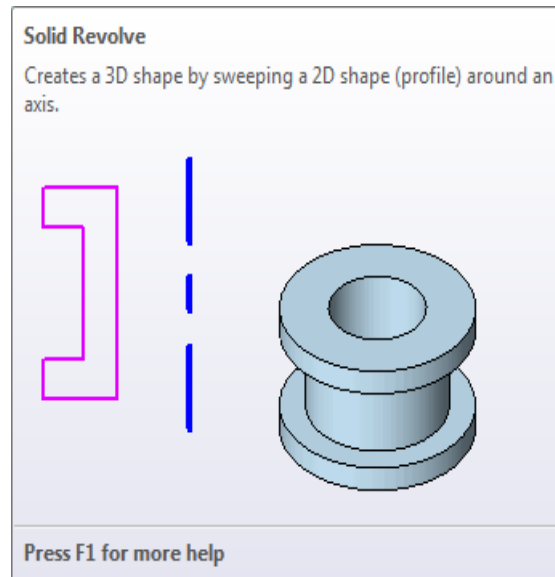






Figure 2.12

To create a solid or void revolve

1. In the Family Editor, on the Create tab ► Forms panel, do one of the following:
 - Click  (Revolve).
 - Click Void Forms drop-down ►  (Void Revolve).

Note: If necessary, set the work plane before you sketch the revolve. Click Create tab ► Work Plane panel ►  (Set).

2. Place an **axis** of revolution:
 1. On the Modify | Create Revolve tab ► Draw panel, click  (Axis Line).
 2. Specify the start and endpoint of the axis at the desired orientation.
3. Use the **Draw** tools to sketch a shape to revolve around the axis:
 - Click Modify | Create Revolve tab ► Draw panel ►  (Boundary Line).
 - To create a single revolve, sketch a closed loop.
 - To create more than one revolve, sketch multiple, non-intersecting, closed loops.
4. On the Mode panel, click  (Finish Edit Mode).




REVIT ELECTRICAL (FAMILY CREATION)

5. To view the revolve, open a 3D view.
6. To resize the revolve in the 3D view, select and use grips to edit it.

Note: You cannot drag the start and end faces of a 360-degree revolve.

Edit a Revolve

Modify the sketch for the revolve geometry or change the properties.

1. In the drawing area, select the revolve.
2. If you are in the project environment:
 - a. On the Modify | <Element> tab ► Mode panel, click  (Edit Family).
 - b. In the Family Editor, select the revolve in the drawing area again.
3. Click Modify | Revolve tab ► Mode panel ►  (Edit Revolve).
4. If desired, modify the revolve sketch.
5. To edit other revolve properties, on the Properties palette, change the start and end angle values, visibility, material, or subcategory.
6. To change the revolve to a solid or a void, under Identity Data, for Solid/Void, select Solid or Void.
7. Click Apply.
8. On the Mode panel, click  (Finish Edit Mode).

d) Sweep or Swept Blend

About Sketching Tools for a Sweep or Swept Blend

Use the Sketch Path or Pick Path tool to draw the path for a sweep or swept blend.

Sketch Path

Use the sketching tools to create a path for the sweep or the swept blend.

The path can be a single closed path or a single open path. You cannot have multiple paths.

The path can be a combination of straight lines and curves, and it need not be planar.

Pick Path

Use the Pick Path tool to indicate the path for a sweep or a swept blend.



To select edges of other solid geometry, such as extrusions or blends, click Pick 3D Edges on the ribbon. Or pick existing sketch lines, watching the status bar to know what you are picking.


This method of picking automatically locks the sketch lines to the selected geometry and allows you to sketch the path in multiple work planes, hence allowing for a 3D path.

Sweep




To create a solid or void sweep

1. In the Family Editor, on the Create tab > Forms panel, do one of the following.

- To create a solid sweep, click  (Sweep).
- To create a void sweep, click Void Forms drop-down >  (Void Sweep).

Note: If necessary, set the work plane before you sketch the sweep. Click Create tab > Work Plane panel >  (Set).


2. Specify the sweep path:

- To sketch a new path for the sweep, click Modify | Sweep tab > Sweep panel >  (Sketch Path).
- To select an existing line for the sweep, click Modify | Sweep tab > Sweep panel >  (Pick Path).
You can use the Pick Path tool to make a sweep that uses multiple work planes.
- On the Mode panel, click  (Finish Edit Mode).

3. Load or sketch a profile.


REVIT ELECTRICAL (FAMILY CREATION)



To load a profile

- a. Click Modify | Sweep tab ► Sweep panel, and select a profile from the Profile list.
If the profile you need is not already loaded in the project, click Modify | Sweep tab ► Sweep panel ►  (Load Profile) to load the profile.
- b. On the Options Bar, use the X, Y, Angle, and Flip options to adjust the position of the profile.

Enter values for X and Y to specify the offset for the profile.
Enter a value for Angle to specify the angle of the profile. The angle rotates the profile around the profile origin. You can enter negative values to rotate in the opposite direction.
Click Flip to flip the profile.
- c. Click Apply.
- d. Select the path, and in a 3D view, zoom in to see the profile.

To sketch a profile








- a. Click Modify | Sweep tab ► Sweep panel, verify <By Sketch> is displayed, and then click  (Edit Profile).
 - b. If the Go To View dialog displays, select the view where you want to sketch the profile, and click OK.

For example, if you sketched the path in a plan view, you would choose an elevation view to sketch the profile. The profile sketch can be a single-closed loop or multiple closed loops that do not intersect. Sketch the profile near the intersection of the profile plane and the path.
 - c. Sketch the profile. Profiles must be closed loops.
 - d. Click Modify | Sweep ► Mode ►  (Finish Edit Mode).
4. On the Mode panel, click  (Finish Edit Mode).

REVIT ELECTRICAL (FAMILY CREATION)

Edit a Sweep

Modify the sweep path, profile, and properties.

1. In the drawing area, select the sweep.
2. If you are in the project environment:
 - a. On the Modify | <Element> tab ► Mode panel, click  (Edit Family).
 - b. In the Family Editor, select the sweep in the drawing area.
3. On the Modify | Sweep tab ► Mode panel, click  (Edit Sweep).
4. To modify the sweep path:
 - On the Modify | Sweep tab ► Sweep panel, click  (Sketch Path).
 - Use the tools on the Modify | Sweep > Sketch Path tab to modify the path.
 - On the Mode panel, click  (Finish Edit Mode).
5. To modify the sweep profile:
 - On the Modify | Sweep tab ► Sweep panel, click  (Select Profile).
 - On the Sweep panel, use the tools that display to select a new sweep profile or change the sweep profile location.
 - To edit the existing profile, on the Sweep panel, click  (Edit Profile), and use the tools on the Modify | Sweep > Edit Profile tab.
 - On the Mode panel, click  (Finish Edit Mode) to finish editing the profile and again to finish editing the sweep.
6. To edit other sweep properties, select the sweep, and on the Properties palette, change the visibility, material, segmentation, or subcategory of the sweep, as desired.
7. To change the sweep to a solid or a void, under Identity Data, for Solid/Void, select Solid or Void.
8. Click Apply.

Swept Blend

The shape of the swept blend is determined by the starting shape, the ending shape, and the 2D path that you specify.

About swept blends

The Swept Blend tool allows you to create a blend that has 2 different profiles and then sweep it along a path. The shape of a swept blend is determined by the 2D path you either sketch or pick and the 2 profiles you either sketch or load as shown in Figure 2.13.

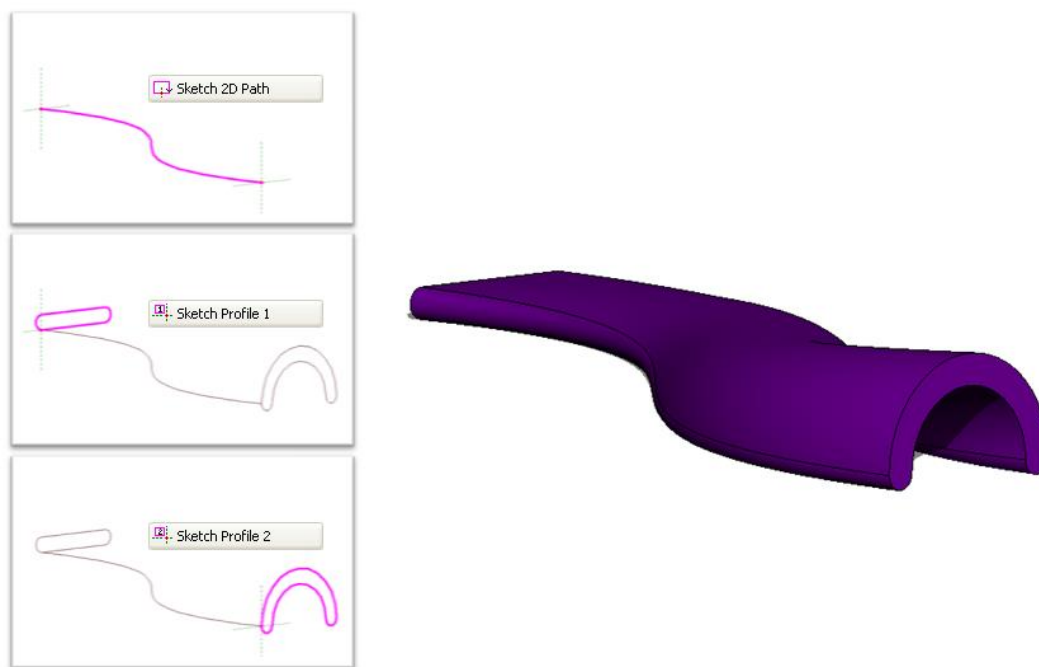





Figure 2.13

The following procedure is a general method for creating a swept blend. Steps may vary depending on your design intent.



To create a solid or void swept blend

1. In the Family Editor, on the Create tab > Forms panel, do one of the following:
 - To create a solid swept blend, click  (Swept Blend).
 - To create a void swept blend, click Void Forms drop-down >  (Void Swept Blend).
2. Specify the path for the swept blend.

Note: If necessary, set the work plane before you sketch or pick the path for the swept blend. Click Create tab > Work Plane panel >  (Set).


REVIT ELECTRICAL (FAMILY CREATION)

Do one of the following on the Modify | Swept Blend tab ► Swept Blend panel:

- Click  (Sketch Path) to sketch a path for the swept blend.
- Click  (Pick Path) to pick existing lines and edges for the swept blend.

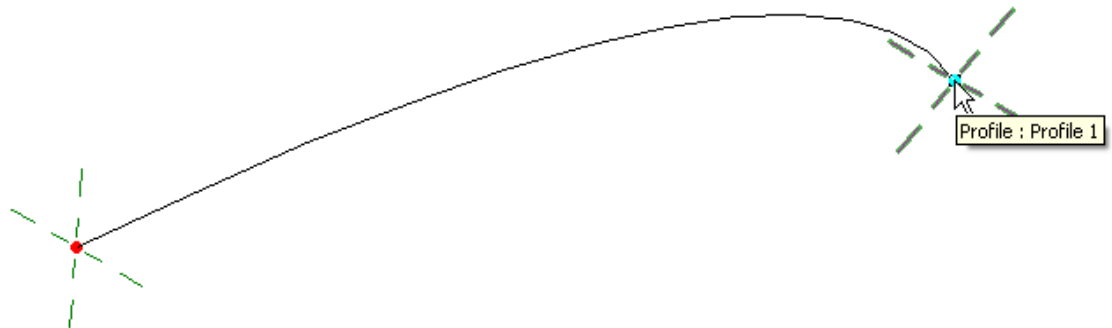
3. Sketch or pick the path.

To select edges of other solid geometry, such as extrusions or blends, click Pick Path. Or pick existing sketch lines, watching the status bar to know what you are picking. This method of picking automatically locks the sketch lines to the geometry you are picking and allows you to sketch the path in multiple work planes, hence allowing for a 3D path.


4. On the Mode panel, click  (Finish Edit Mode)

5. Load or sketch Profile 1.

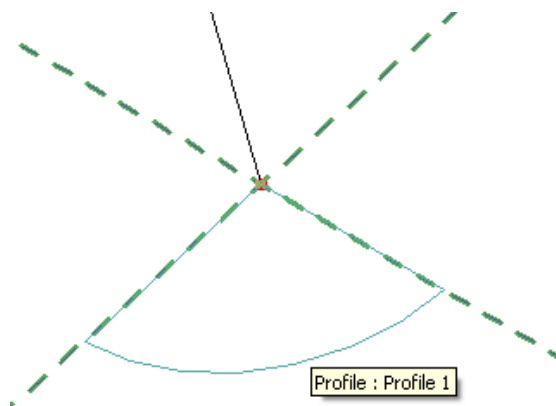
The end point for Profile 1 on the swept blend path is highlighted.







- To load a profile:
 - a. Click Modify | Swept Blend tab ► Swept Blend panel, and select a profile from the Profile drop-down.

If the profile you need is not already loaded in the project, click  (Load Profile) to load the profile.

- b. Zoom in to see the profile.





REVIT ELECTRICAL (FAMILY CREATION)



- c. Use the X, Y, Angle, and Flip options to adjust the position of the profile.
Enter values for X and Y to specify the offset for the profile.
Enter a value for Angle to specify the angle of the profile. The angle rotates the profile around the profile origin. You can enter negative values to rotate in the opposite direction.
Click Flip to flip the profile.
- d. Click Apply.
- To sketch a profile:
 - a. On the Swept Blend panel, verify that <By Sketch> is selected and click  (Edit Profile).
 - b. If the Go To View dialog displays, select the view where you want to sketch the profile, and click OK.
 - c. Use the tools on the Modify | Swept Blend > Edit Profile tab to sketch the profile. Profiles must be closed loops.
 - d. On the Mode panel, click  (Finish Edit Mode).
6. Click Modify | Swept Blend tab > Swept Blend panel >  (Select Profile 2).
7. Load or sketch Profile 2 using the steps above.
9. When finished, click Mode panel >  (Finish Edit Mode).






Edit a Swept Blend

Modify the path, the profiles, and the properties for the swept blend.

1. In the drawing area, select the swept blend.
2. If you are in the project environment:
 - a. On the Modify | <Element> tab > Mode panel, click  (Edit Family).
 - b. In the Family Editor, select the swept blend in the drawing area.
3. On the Modify | Swept Blend tab > Mode panel, click  (Edit Swept Blend).

REVIT ELECTRICAL (FAMILY CREATION)

4. To edit the path:
 - a. On the Modify | Swept Blend tab ► Swept Blend panel, click  (Sketch Path).
 - b. Use the tools on the Modify | Swept Blend > Sketch Path tab to modify the path, and click Mode panel ►  (Finish Edit Mode).

5. To edit the profiles:
 - a. On the Modify | Swept Blend tab ► Swept Blend panel, click  (Select Profile 1) or  (Select Profile 2).
 - b. On the Swept Blend panel, select a different loaded profile from the drop-down list, or select <By Sketch> from the list to sketch a new profile.
 - c. If you selected <By Sketch>, click  (Edit Profile) on the Swept Blend panel.
 - d. Sketch the profile and then click Mode panel ►  (Finish Edit Mode) to finish editing the profile.
 - e. Click Mode panel ►  (Finish Edit Mode) to finish editing the sweep.

6. On the Properties palette, change the visibility, material, or subcategory of the sweep, as desired.

7. To change the swept blend to a solid or a void, under Identity Data, for Solid/Void, select Solid or Void.

8. Click Apply.

2.2 Starting Component Families

Process of Creating Families

Creating families is a critical task because after the template has been selected and the geometry created, the basic options in the family are programmed into the family and cannot be changed.

Process: Creating Families

The following illustration shows below the process of creating families as shown in Figure 2.14.

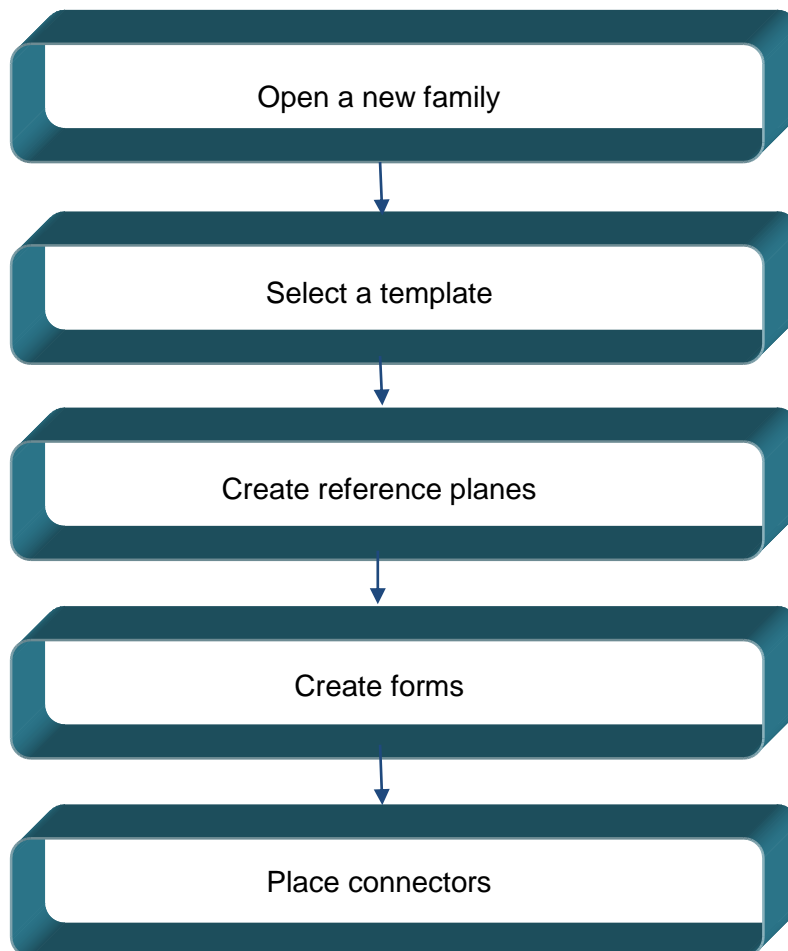


Figure 2.14

REVIT ELECTRICAL (FAMILY CREATION)

The following steps describe the process of creating families.

1. Open a new family
 - Open a new family by selecting New > Family from the applications menu.
2. Select a template
 - By default, opens the **Metric Templates** folder. Select a template to define the hosting of a component. Templates also define the type of family, such as annotation, model, title block or profile.
3. Create reference planes
 - Create the reference plane using the Reference Plane tool on the Datum panel of the Create tab in the Family Editor. Specifying the reference planes with properly labeled dimensions to create parametric families is the key to creating reusable families. Reference planes are also used as alignment points.
4. Create forms
 - Create forms or the geometry of a component that will be part of the family. The options for creating geometry that include basic solid or void form for extrusion, blend, revolve, sweep and sweep blend.
5. Place connectors
 - Place connectors, keeping in mind the flow of information through the system. Electrical connectors are not physical connectors with the ability to draw conduit; these conductors can simply be placed on any face of an extrusion.

REVIT ELECTRICAL (FAMILY CREATION)

Exercise: Create a Box Family

In this exercise, create a box family by creating reference planes and parametric geometry.

Please do the following:

- ❖ Create reference planes and add dimension
- ❖ Create an extrusion and add a connector

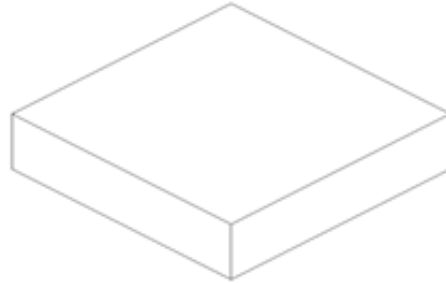


Figure 2.15 : Box Family

Create Reference Planes and Add Dimension

1. On the application menu, click New > Family.
2. In the New Family – Select Template File dialog box as shown in Figure 2.16:
 - Navigate to the folder where saved the exercise dataset
 - Select **Metric Generic Model.rft**

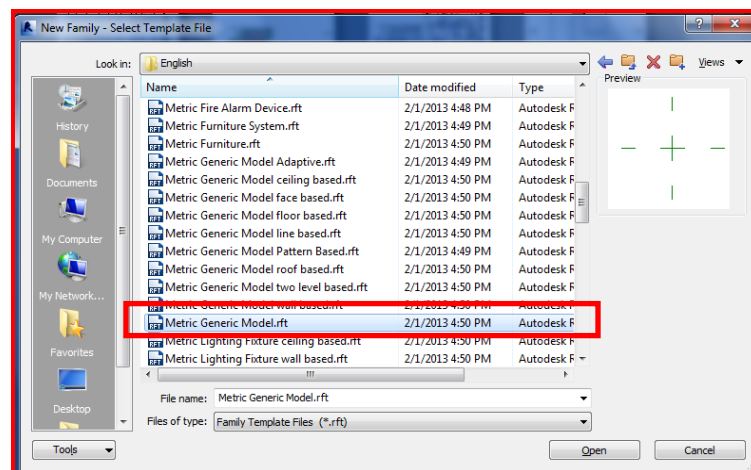


Figure 2.16

- Click Open.

REVIT ELECTRICAL (FAMILY CREATION)

3. Enter **WT** to tile the windows.
4. To begin drafting reference planes, maximize the Floor Plan: Ref. Level view window as shown in Figure 2.17.

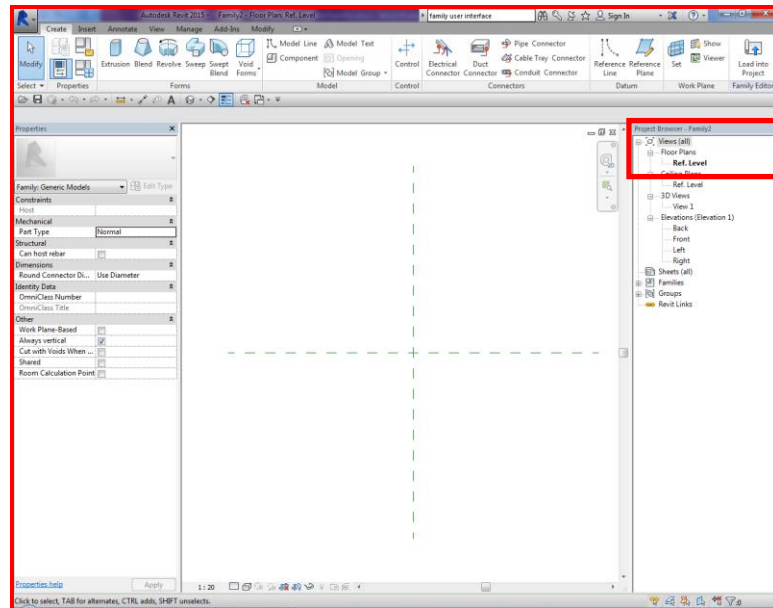


Figure 2.17

5. Zoom to fit the window.
6. Click Create tab > Datum panel > Reference Plane.
7. In the view window, on either side of the vertical centerline, draw reference plane as shown. The exact location is not critical as shown in Figure 2.18.

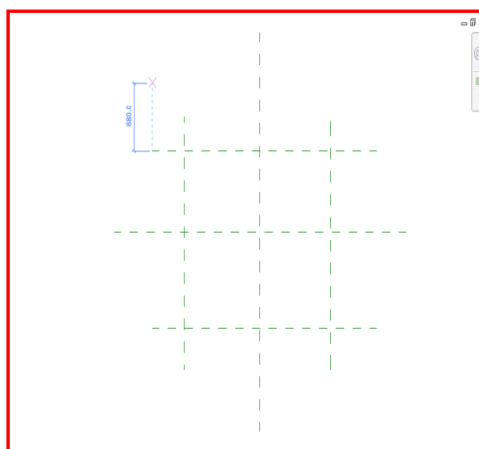


Figure 2.18

8. Exit the Reference Plane tool.

REVIT ELECTRICAL (FAMILY CREATION)

9. To keep the reference plane equidistant, create an equal dimension then use this dimension to control the geometry. To do this, click Detail tab > Dimension panel > Aligned

10. In the view window as shown in Figure 2.19:

- Click the three vertical reference planes in succession.
- Click to place the dimension string above the planes. Notice that an EQ symbol with a slash appears on the dimension string.
- Click the EQ symbol to make the planes equidistant.

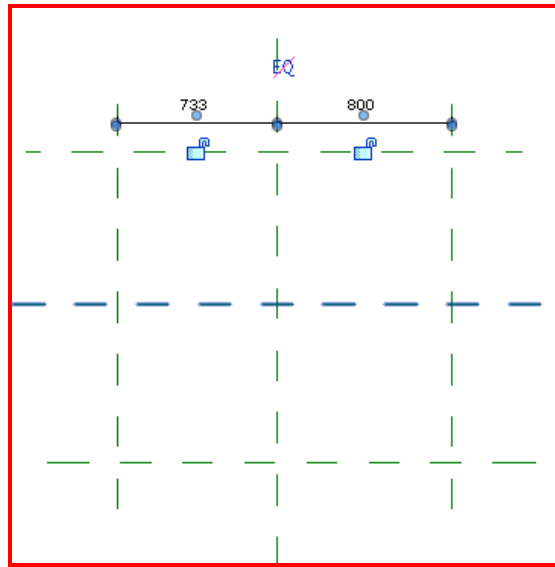


Figure 2.19

11. Exit the Aligned dimension tool.

12. To add dimension to control the two outer planes, activate the Aligned dimension tool.

13. In the view window:

- Click to select the vertical centerline.
- Click one of the outer planes.
- Move the dimension string up and click to place it.

REVIT ELECTRICAL (FAMILY CREATION)

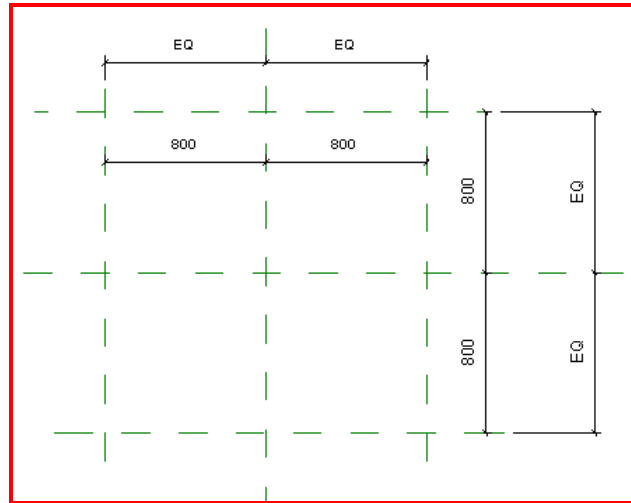


Figure 2.20

14. Exit the aligned dimension tool.

15. In the view window as shown in Figure 2.21:

- Select the dimension that just placed.
- To map this dimension, on the Option Bar, for Label, select a parameter, or choose <Add parameter...>, and create a parameter (Length, Width or Height).
- After creating the parameter, you can use the Family Types tool on the Properties panel to modify the default value, or specify a formula, as required.
- If desired, select Leader to create a leader line for the dimension.

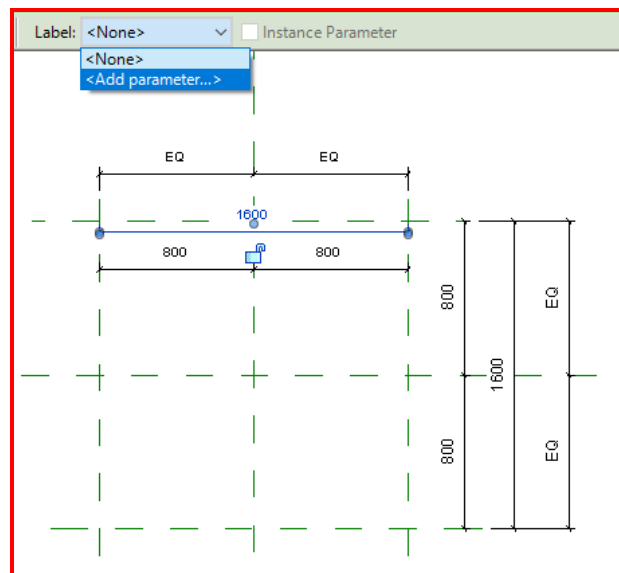


Figure 2.21

REVIT ELECTRICAL (FAMILY CREATION)

16. Open the **Reference Level Floor Plan**

17. Click Create tab > Form panel > Click Extrusion > Draw panel > Rectangular

18. In the view tab, draw a rectangular outline from the upper-left corner to the lower-right corner created by the intersection of the reference planes as shown in Figure 2.22.

19. To associate the lines with the references planes, click all open padlocks.

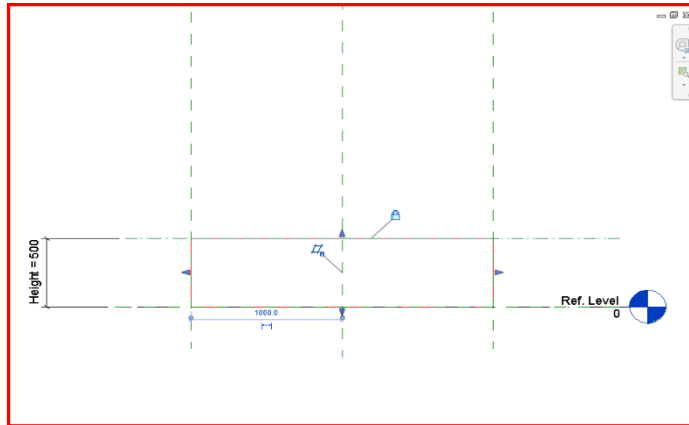


Figure 2.22

20. Open the default 3D as shown in Figure 2.23.

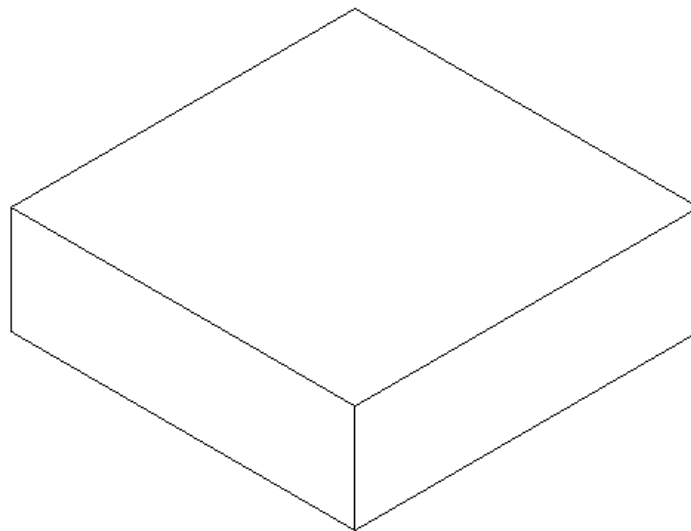


Figure 2.23

REVIT ELECTRICAL (FAMILY CREATION)

21. Click Create tab > Connectors panel > Conduit Connector.

22. In the view window as shown in Figure 2.24:

- Click the top face of the family to place the connector on the top of the terminal. **Tip:** Use the TAB key to locate the top face of the family
- Exit the Conduit Connector tool.

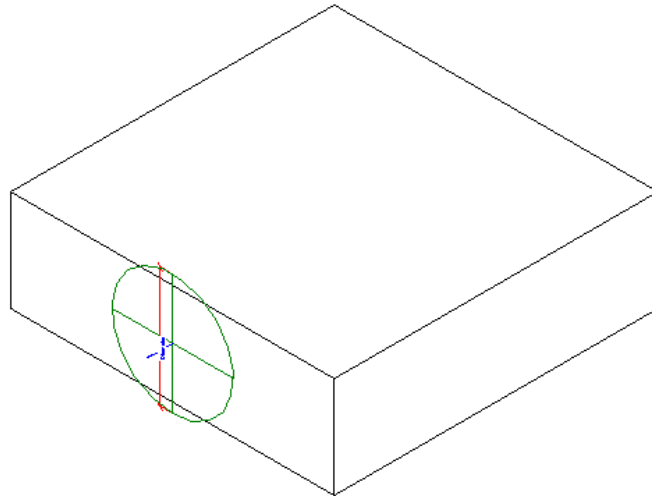


Figure 2.24

23. Select the connector that just placed. In the Instance properties dialog box, under Dimension:

- Set diameter to 20.
- Click Apply.

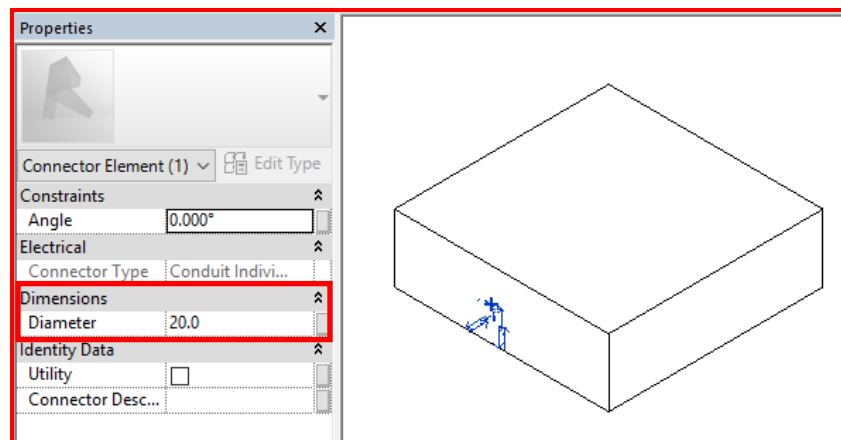


Figure 2.25

REVIT ELECTRICAL (FAMILY CREATION)

24. Clear the selection. Now load the family into a project and use it as required.
25. Close the file without saving changes.


3.0 WORKING WITH PARAMETERS

3.1 Family parameters

Create Family Parameters

You can create new instance parameters or type parameters for any family type. By adding new parameters, you have more control over the information contained in each family instance or type. You can create dynamic family types for increased flexibility within the model.

To create parameters

1. In the Family Editor, click Create tab ► Properties panel ►  (Family Types).
2. In the Family Types dialog, click New, and enter a name for the new type.

This creates a new family type that will be available in the Type Selector when you load it into a project as shown in Figure 3.1.
3. Under Parameters, click Add.
4. In the Parameter Properties dialog, under Parameter Type, select Family parameter as shown in Figure 3.1.
5. Enter a name for the parameter.
6. Select a discipline.
7. Select the type of parameter. (Electrical Family Parameters)
8. For Group parameter under, select a value.

After the family is loaded into a project, this value determines which group header the parameter displays under on the Properties palette.
9. Select either Instance or Type. This defines whether the parameter is an Instance or Type parameter.
10. Click OK.

By default, new parameters are added in ascending alphabetic order to the parameter list, within the group that you selected when creating the parameter.
11. Optionally, in the Family Types dialog, select a parameter and use the Move Up and Move Down buttons to manually change the order of the parameters within a group.

REVIT ELECTRICAL (FAMILY CREATION)

This parameter order will be maintained in the Properties palette (instance parameters) and Type Properties dialog (type parameters) for the family when it is loaded into a project.

Note: The Sorting Order and the Move Up and Move Down buttons are not available when editing Rebar Shape family parameters.

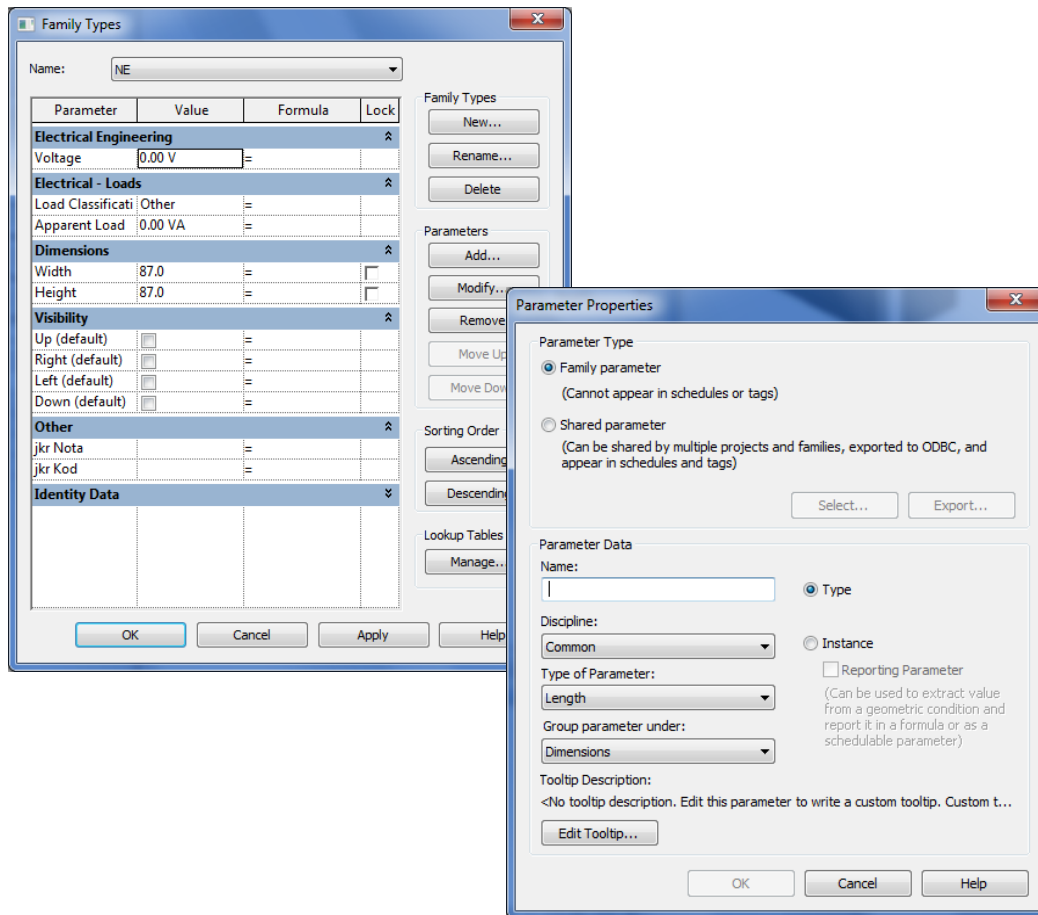



Figure 3.1

3.2 Shared parameters

Create Shared Parameters

Use the Family Editor to add shared parameters to families.

1. Start creating a family or open an existing one.
2. In the drawing, select the object.
3. Click Modify | <object> tab ► Properties panel ►  (Family Types).
4. In the Family Types dialog, under the Parameters group box, click Add.
5. In the Parameter Properties dialog, select Shared parameter.
6. Click Select and choose the appropriate shared parameter from the appropriate parameter group.
7. If desired, click Edit; this returns you to the Edit Shared Parameters dialog, where you can open a different shared parameter file or add new parameters.
8. Choose whether to store the parameter by instance or type.
9. Click OK.
The parameter name appears in the Family Types dialog.
10. Enter a value for the shared parameter or create a formula to calculate its value.
11. Optionally, in the Family Types dialog, select a parameter and use the Move Up and Move Down buttons to change the order of the parameters within a group.

This parameter order will be maintained in the Properties palette (instance parameters) and Type Properties dialog (type parameters) for the family when it is loaded into a project.
12. Click OK.
13. Save the family and load it into a project.