



# BEXEL **MANAGER**

Mesh Splitting – V1.0

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## Introduction

There are numerous scenarios where it is useful to be able to split meshes according to grids/stories/global positions etc. With this experimental feature Bexel is now able to perform this operation when loading a model, utilizing a preconfigured configuration file.

## How to use

When creating a new project or version, you will be presented with the regular window as shown below. Clicking on “Choose” under “Mesh Splitting:” will allow you to choose a configuration from the default *Knowledge Base / Mesh Splitting*. Optionally, you can choose a custom configuration file that you’ve created yourself. Note: The default configuration file includes settings that most likely won’t fit with your project. Be sure to configure it as relevant.

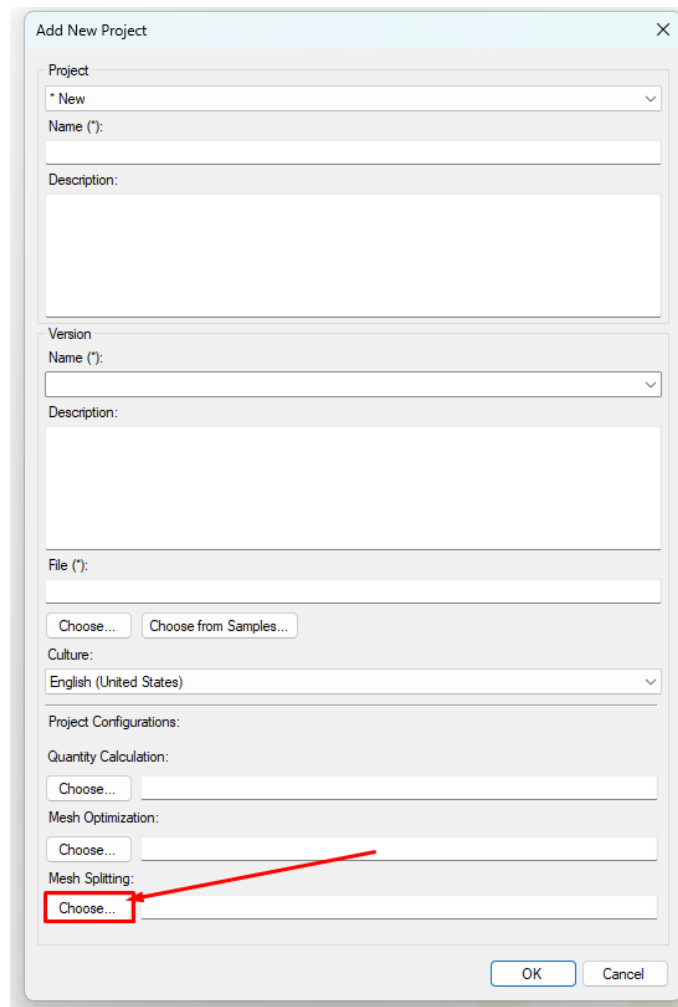


Figure 1 - New Project Form

Once you've filled in the other fields in the form, go ahead and click on "OK" to load the project.

Once the project is loaded, we need to load a custom breakdown structure from the "Knowledge Base" to quickly assess the results of the optimization. Select all the model elements and then follow the following steps:

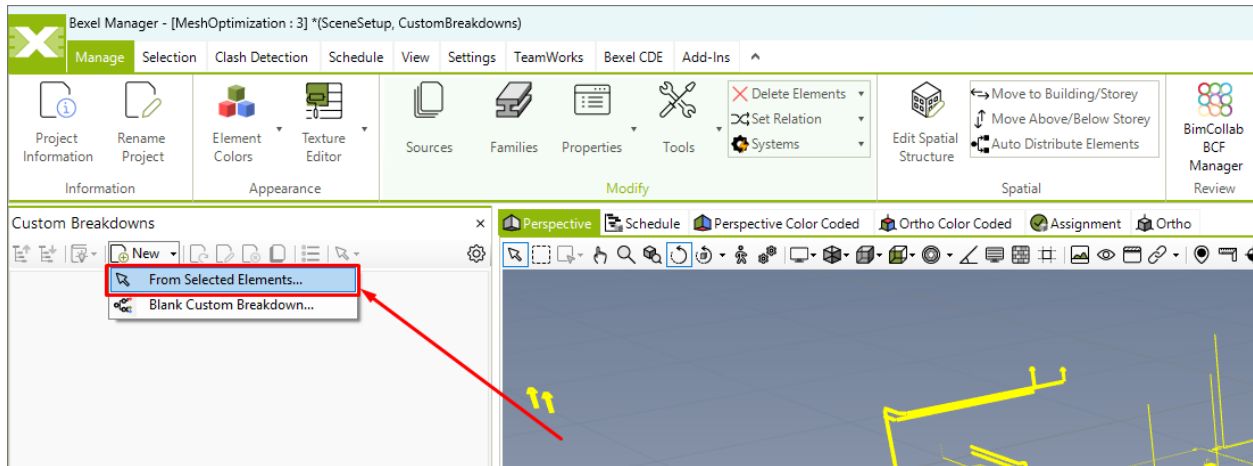


Figure 2 - Custom Breakdown 1/2

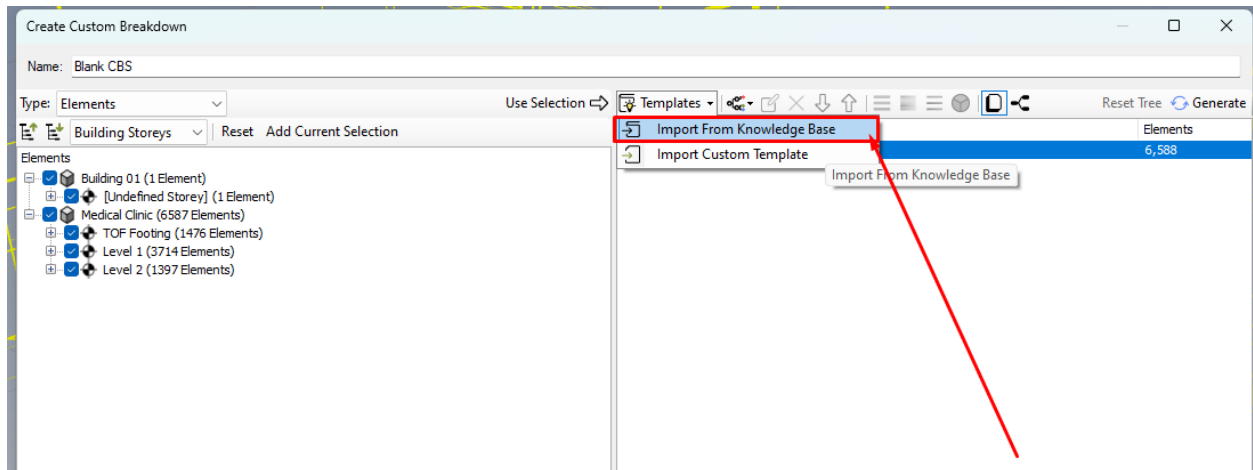


Figure 3 - Custom Breakdown 2/2

- Choose the template related to Mesh Splitting and then click on "OK"

Change your viewer to "Perspective Color Coded" mode and you should see similar results to that below:



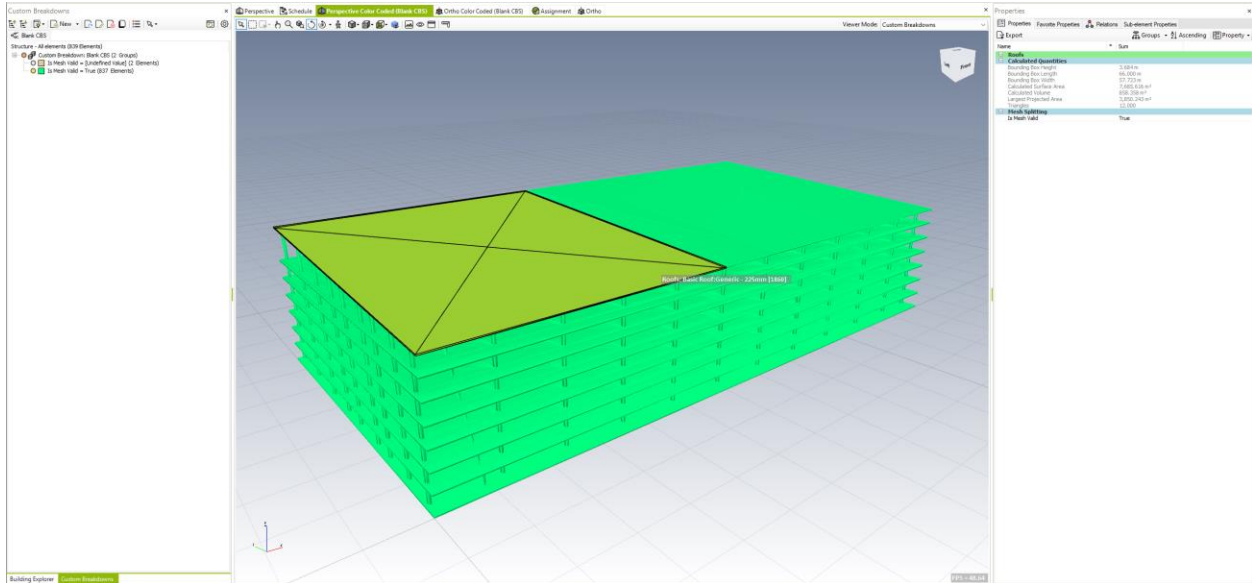


Figure 4 - Results with Custom Breakdown

The viewer now visualizes the results of the mesh splitting process according to the following result outputs:

- **True** – After splitting the integrity of the split is good.
- **False** – After splitting the integrity of the split is bad. This mesh should not be used for quantity calculation purposes or clash detection.
- **Undefined** – Mesh integrity could not be ascertained. This could be because the object has no geometry. In any case, this mesh should not be used for quantity calculation purposes or clash detection.

The example model showed previously included columns and walls that spanned the entire height of the building, as well as slabs & foundations that spanned the entire length of the building:

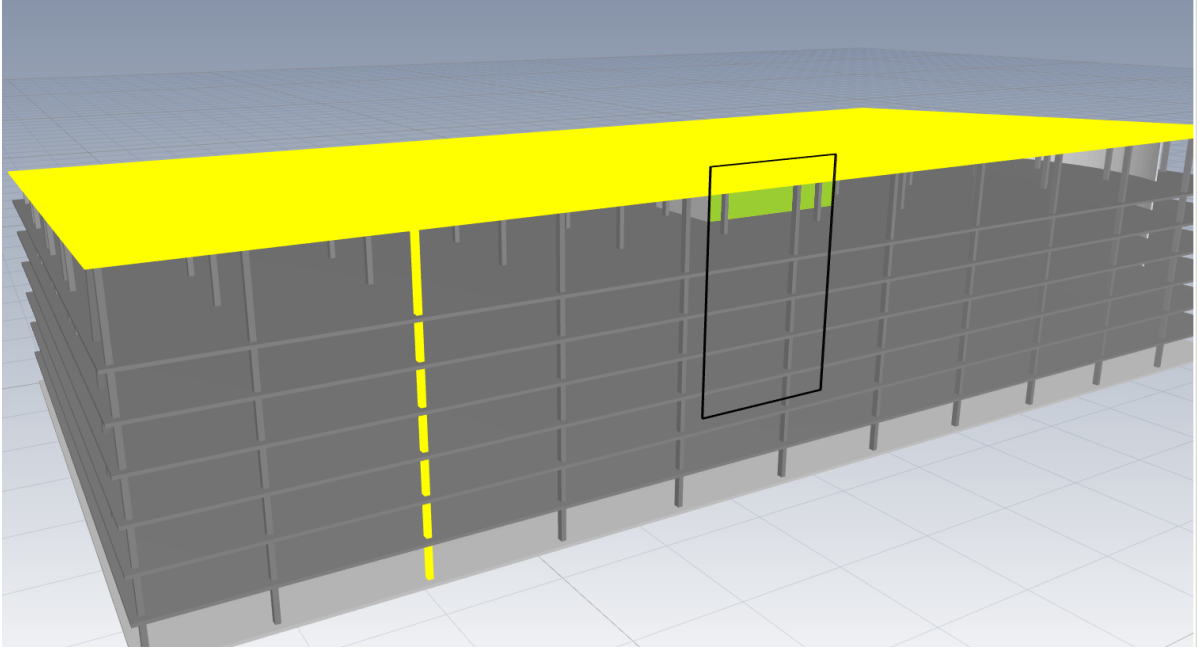


Figure 5 - Pre-Splitting

And after splitting:

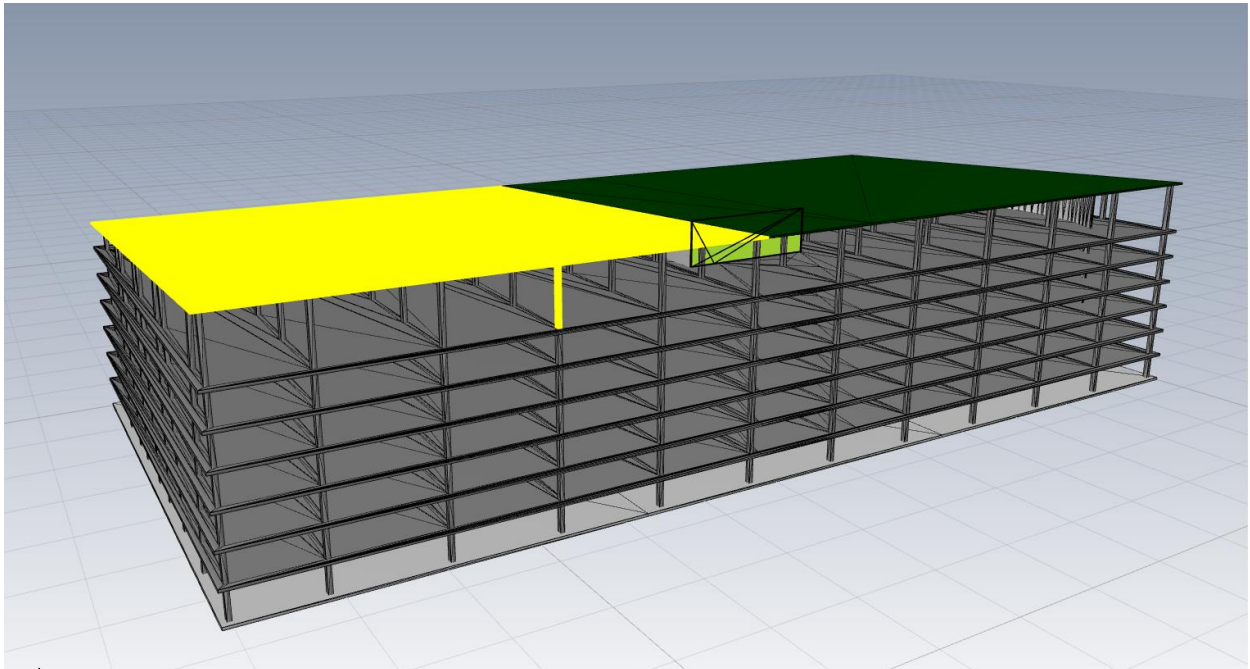


Figure 6 - Post Splitting

## Editing the Configuration

The basic makeup of the configuration file is as follows:

- **Version** - The version of the configuration file. (The latest version is 1.0.0.0)
- **Enabled (true or false)** - Whether Bexel Manager should perform any mesh splitting
- **SplitByStorey** – Settings for splitting objects according to building stories defined in the model
- **SplitGlobally** – Settings for splitting objects according to global coordinates.
- **SplitAlongElement** - Settings for splitting objects along their local axis & dimensions.

```
1  {
2    "Version": "1.0.0.0",
3    "Enabled": true,
4    "SplitByStorey": {},
5    "SplitGlobally": {},
6    "SplitAlongElement": {}
7  }
8
```

Figure 7 - Basic Configuration

### Split By Storey

The SplitByStorey object contains three possible keys:

- **ApplyToAllCategories** – defaults to true. If true, will apply “AllCategories” settings, otherwise “PerCategory”
- **AllCategories** – An list of objects containing the following settings:
  - **StoreyName** – The name of the storey as it is defined in the BIM Model
  - **Offset** – An optional offset in metres. If not needed this can be omitted from the configuration

```

1  {
2    "Version": "1.0.0.0",
3    "Enabled": true,
4    "SplitByStorey": {
5      "AllCategories": [
6        { "StoreyName": "L2" },
7        { "StoreyName": "L3" },
8        { "StoreyName": "L4" },
9        { "StoreyName": "L5" },
10       { "StoreyName": "L6" },
11       { "StoreyName": "L7" }],
12   }

```

Figure 8 - Example settings for Storey Split

- **PerCategory** – Similar to AllCategories, except that this is now an object where each key is the name of a Bexel Category and its corresponding value is the settings object:

```

1  {
2    "Version": "1.0.0.0",
3    "Enabled": true,
4    "SplitByStorey": {
5      "ApplyToAllCategories": false,
6      "PerCategory": {
7        "Wall": [
8          { "StoreyName": "L2" },
9          { "StoreyName": "L3" },
10         { "StoreyName": "L4" },
11         { "StoreyName": "L5" },
12         { "StoreyName": "L6" },
13         { "StoreyName": "L7" }
14       ],
15      "StructuralColumn": [
16        { "StoreyName": "L2" },
17        { "StoreyName": "L3" },
18        { "StoreyName": "L4" },
19        { "StoreyName": "L5" },
20        { "StoreyName": "L6" },
21        { "StoreyName": "L7" }
22      ]
23    }
24  },

```

Figure 9 - Example PerCategory Settings (StoreySplit)



And an example where the “Offset” is also defined:

```
7      "Wall": [  
8          { "StoreyName": "L2", "Offset": 0.2},  
9          { "StoreyName": "L3" },  
10         { "StoreyName": "L4", "Offset": 0.2 },  
11         { "StoreyName": "L5" },  
12         { "StoreyName": "L6" },  
13         { "StoreyName": "L7", "Offset": 0.2 }  
14     ],
```

Figure 10 - Storey Offset

## Global Split

The GlobalSplit object contains three possible keys:

- **ApplyToAllCategories** – defaults to true. If true, will apply “AllCategories” settings, otherwise “PerCategory”
- **AllCategories** – A list of objects containing the following settings:
  - **AtPositions** – A list of positions (*Project Coordinates*) at which to split the object. Example: [20.1, 30, 42.0]
  - **CardinalAxis** – The axis to be used for splitting the object using “AtPositions”. Accepted values are “X”, “Y”, “Z”

```
29      {  
30          "AtPositions": [ 6, 54 ],  
31          "CardinalAxis": "X"  
32      },
```

Figure 11 - GlobalSplit Settings

- **PerCategory** – Similar to “AllCategories”, except that this is now an object where each key is the name of a Bexel Category, and its corresponding value is the settings object.

```

25 "SplitGlobally": {
26   "ApplyToAllCategories": false,
27   "PerCategory": {
28     "Slab": [{
29       "AtPositions": [ 6, 54 ],
30       "CardinalAxis": "X"
31     }],
32     "Roof": [{
33       "AtPositions": [ 6, 54 ],
34       "CardinalAxis": "X"
35     }]
36   }
37 }
38 },

```

Figure 12 -GlobalSplit Settings (PerCategory)

**TIP:** You can create multiple successive splits to be performed in sequence:

```

33 "Roof": [
34   {
35     "AtPositions": [ 6, 54 ],
36     "CardinalAxis": "X"
37   },
38   {
39     "AtPositions": [ -2.8 ],
40     "CardinalAxis": "Y"
41   },
42 ]
43 ]

```

Figure 13- Multiple splits config

And the result from this split:

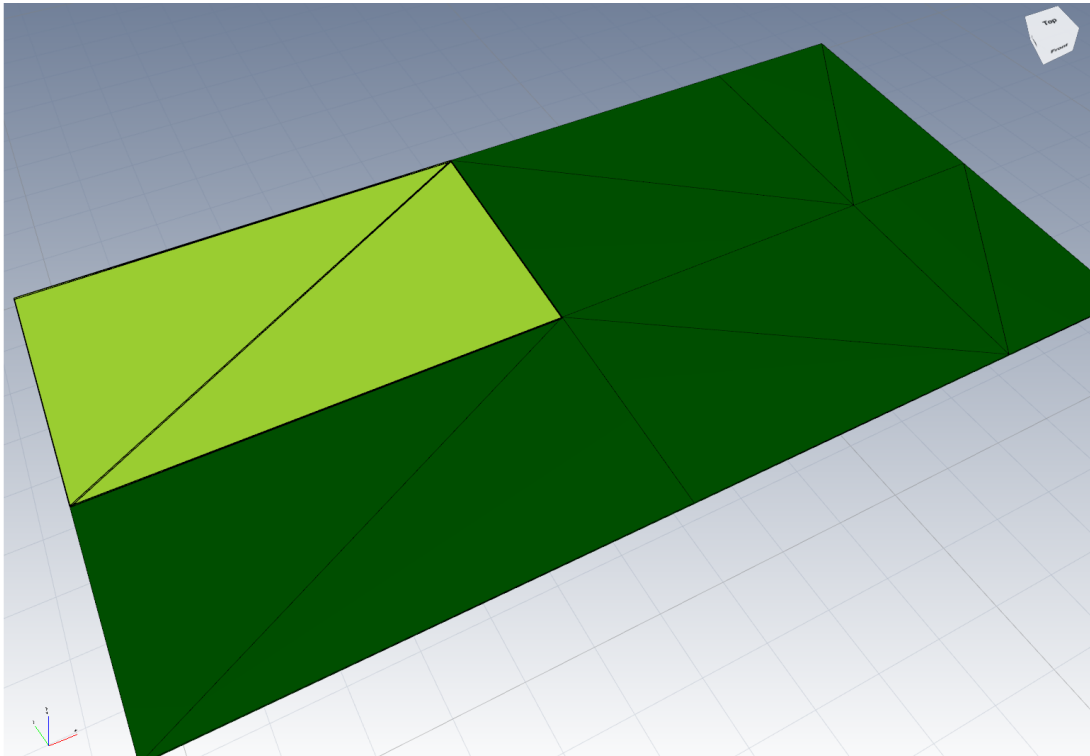


Figure 14 - Multiple split result

## Split Along Element

The SplitAlongElement object contains three possible keys:

- **ApplyToAllCategories** – defaults to true. If true, will apply “AllCategories” settings, otherwise “PerCategory”
- **AllCategories** – A list objects containing the following settings:
  - **SplitDirection** - A choice between three options. This setting defines which setting will be used for defining splitting planes (**CardinalSplitAxis**, **CustomCardinalSplitAxis** or **ObbSplitDirection**).
    - **CARDINAL** – The global x,y and z axis are used for defining splitting planes
    - **CUSTOM** - The global x,y and z axis are used for defining splitting planes, but which particular one is used depends on the setting used below
    - **OBB** - The Oriented Bounding Box axis are used

- **CardinalSplitAxis** – A choice between X, Y or Z. These are the global axis used in Bexel Manager.
  - **CustomCardinalSplitAxis** – A choice between LONGEST\_AXIS, SHORTEST\_AXIS, LONGEST\_XY\_AXIS and SHORTEST\_XY\_AXIS
  - **ObbSplitDirection** - A choice between LONGEST\_AXIS and SHORTEST\_AXIS,
  - **SplitEqually** – true or false. If true, the split will generate equidistant splits, according to the number of splits specified in “SplitIntoNSegments”
  - **SplitIntoNSegments** – the number of equidistant splits
  - **SplitAtPositions** - The points at which the mesh should be split (*Project Coordinates*), expressed as a ratio. ie. 0.5 is the middle of the mesh or 0.5 x Length along chosen Axis.
- **PerCategory** – Similar to “AllCategories”, except that this is now an object where each key is the name of a Bexel Category, and its corresponding value is a list of settings objects.

```

46     "SplitAlongElement": {
47         "ApplyToAllCategories": false,
48         "PerCategory": {
49             "StructuralFoundation": [{
50                 "SplitDirection": "CARDINAL",
51                 "CardinalSplitAxis": "X",
52                 "SplitEqually": true,
53                 "SplitIntoNSegments": 3
54             }]
55         }
56     }

```

Figure 15 - Example SplitAlongElement Setting

## Example – Custom Split along Longest XY Axis



```
"SplitAlongElement": {  
  "ApplyToAllCategories": false,  
  "PerCategory": {  
    "StructuralFoundation": [{  
      "SplitDirection": "CUSTOM",  
      "CustomCardinalSplitAxis": " LONGEST_XY_AXIS ",  
      "SplitEqually": false,  
      "SplitAtPositions": [0.3, 0.7]  
    }  
  ]  
}
```

## Example – Split along OBB

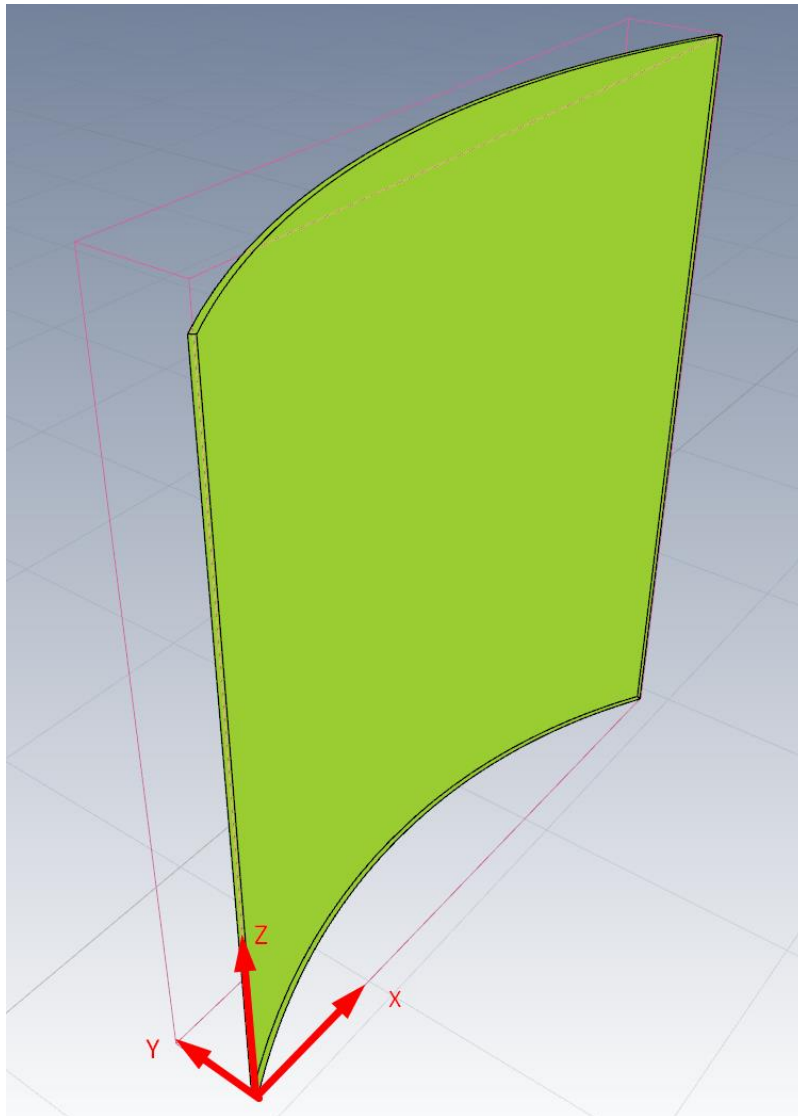


Figure 16 - OBB Example

In the image above, the red outline indicates the oriented bounding box for the curved wall, and in this case the shortest axis would be the Y-axis. The configuration below would therefore split the element at halfway along the Y-axis, as indicated above.

```

"SplitAlongElement": {
  "ApplyToAllCategories": false,
  "PerCategory": {
    "StructuralFoundation": [{
      "SplitDirection": "OBB",
      "ObbSplitDirection": "SHORTEST_AXIS",
      "SplitEqually": false,
      "SplitAtPositions": [0.5]
    }]
  }
}

```

Example – Split into 3 parts

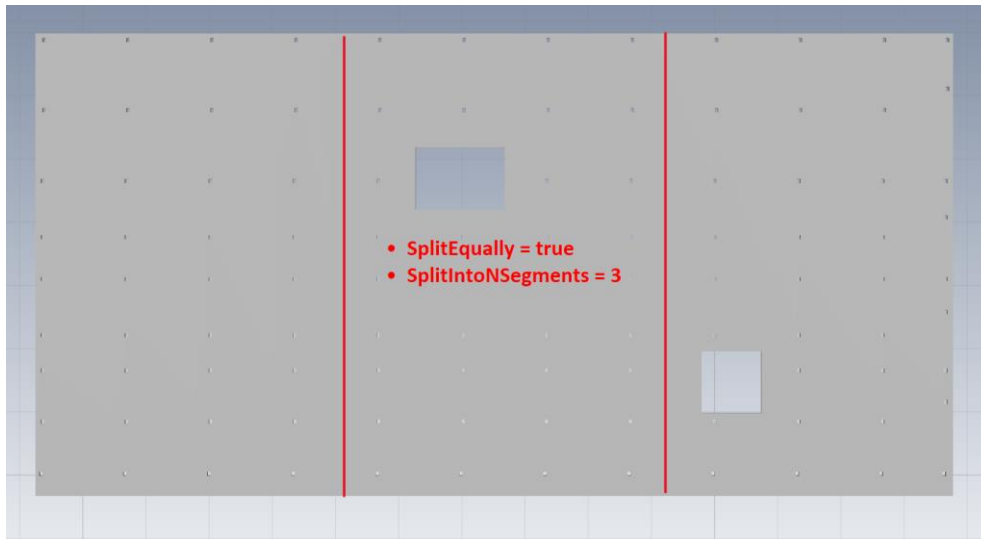


Figure 17 - Global Split into 3 parts

```

"SplitAlongElement": {
  "ApplyToAllCategories": false,
  "PerCategory": {
    "StructuralFoundation": [{
      "SplitDirection": "OBB",
      "ObbSplitDirection": "LONGEST_AXIS",
      "SplitEqually": true,
      "SplitIntoNSegments": 3
    }]
  }
}

```

## Limitations

- Like the Mesh Optimization feature, mesh splitting relies on the soundness of the input geometry to work properly. In the event of a poor input mesh, Bexel Manager will set the value of the “Is Mesh Valid” property to false (found under the “Mesh Splitting” group). If this property is indeed false, it means the geometry cannot be relied upon to produce accurate quantities. Beware of this if the split geometry is to be used for the QTO or Scheduling Module.
- Using the splitting feature is currently disabled when updating an existing project, or when loading a Bexel Manager “.besln” file.





## Appendix 1 – (Mapping ) IFC Class to Bexel Manager Category

**IfcSite:** Site

**IfcBuilding:** Building

**IfcBuildingStorey:** Storey

**IfcSpace:** Space

**IfcSpatialZone:** Space

**IfcSpatialZoneType:** Space

**IfcBeam:** Beam

IfcBeam\_Structural Framing: Beam

**IfcBeamStandardCase:** Beam

**IfcChimneyType:** GenericModel

**IfcProxy:** GenericModel

**IfcBuildingElementProxy:** GenericModel

IfcBuildingElementProxy\_COMPUTER: DataDevice

IfcBuildingElementProxy\_Communication Devices: CommunicationDevices

IfcBuildingElementProxy\_Duct Accessory: DuctAccessory

IfcBuildingElementProxy\_Electrical Equipment: ElectricalEquipment

IfcBuildingElementProxy\_Electrical Fixture: ElectricalFixture

IfcBuildingElementProxy\_Lighting Device: LightingDevice

IfcBuildingElementProxy\_Mass: Mass

IfcBuildingElementProxy\_Mechanical Equipment: MechanicalEquipment

IfcBuildingElementProxy\_Security Devices: SecurityDevices

IfcBuildingElementProxy\_Specialty Equipment: SpecialtyEquipment

IfcBuildingElementProxy\_Parking: Parking

IfcBuildingElementProxy\_Planting: Planting

IfcBuildingElementProxy\_Plumbing Fixture: PlumbingFixture

IfcBuildingElementProxy\_Data Device: DataDevice



IfcBuildingElementProxy\_Toposolid: Toposolid

IfcBuildingElementProxy\_MEP Fabrication Ductwork Stiffeners:  
FabricationDuctworkStiffener

IfcBuildingElementProxy\_Plumbing Equipment: PlumbingEquipment

IfcBuildingElementProxy\_Slab Edges: Slab

IfcBuildingElementProxy\_Structural Framing: Beam

IfcBuildingElementProxy\_Parts: Part

**IfcBuildingElementProxyType:** GenericModel

IfcBuildingElementProxyType\_COMPUTER: DataDevice

IfcBuildingElementProxyType\_Communication Devices: CommunicationDevices

IfcBuildingElementProxyType\_Duct Accessory: DuctAccessory

IfcBuildingElementProxyType\_Electrical Equipment: ElectricalEquipment

IfcBuildingElementProxyType\_Electrical Fixture: ElectricalFixture

IfcBuildingElementProxyType\_Lighting Device: LightingDevice

IfcBuildingElementProxyType\_Mass: Mass

IfcBuildingElementProxyType\_Mechanical Equipment: MechanicalEquipment

IfcBuildingElementProxyType\_Security Devices: SecurityDevices

IfcBuildingElementProxyType\_Specialty Equipment: SpecialtyEquipment

IfcBuildingElementProxyType\_Parking: Parking

IfcBuildingElementProxyType\_Planting: Planting

IfcBuildingElementProxyType\_Plumbing Fixture: PlumbingFixture

IfcBuildingElementProxyType\_Data Device: DataDevice

**IfcColumn:** Column

**IfcColumnStandardCase:** Column

**IfcCovering:** Covering

IfcCovering\_CEILING: Ceiling

IfcCovering\_CLADDING: Covering



IfcCovering\_FLOORING: Slab  
IfcCovering\_INSULATION: Insulation  
IfcCovering\_MEMBRANE: Covering  
IfcCovering\_ROOFING: Roof  
IfcCovering\_SLEEVING: Covering  
IfcCovering\_WRAPPING: Covering  
**IfcCoveringType**: Covering  
IfcCoveringType\_CEILING: Ceiling  
IfcCoveringType\_CLADDING: Covering  
IfcCoveringType\_FLOORING: Slab  
IfcCoveringType\_INSULATION: Insulation  
IfcCoveringType\_MEMBRANE: Covering  
IfcCoveringType\_ROOFING: Roof  
IfcCoveringType\_SLEEVING: Covering  
IfcCoveringType\_WRAPPING: Covering  
**IfcCurtainWall**: CurtainWall  
IfcCurtainWall\_Curtain System: CurtainSystem  
**IfcDoor**: Door  
**IfcDoorStandardCase**: Door  
**IfcFooting**: StructuralFoundation  
IfcFooting\_Structural Columns: StructuralColumn  
IfcFooting\_Structural Framing: Beam  
**IfcMember**: Member  
IfcMember\_MULLION: CurtainWallMullion  
IfcMember\_Curtain Wall Mullion: CurtainWallMullion  
**IfcMemberType**: Member  
IfcMemberType\_MULLION: CurtainWallMullion



IfcMemberType\_Curtain Wall Mullion: CurtainWallMullion

**IfcMemberStandardCase:** Member

IfcMemberStandardCase\_MULLION: CurtainWallMullion

IfcMemberStandardCase\_Curtain Wall Mullion: CurtainWallMullion

**IfcPile:** StructuralColumn

IfcPile\_Structural Foundations: StructuralFoundation

**IfcPlate:** Plate

IfcPlate\_CURTAIN\_PANEL: CurtainPanel

IfcPlate\_Curtain Panel: CurtainPanel

**IfcPlateType:** Plate

IfcPlateType\_CURTAIN\_PANEL: CurtainPanel

IfcPlateType\_Curtain Panel: CurtainPanel

**IfcPlateStandardCase:** Plate

IfcPlateStandardCase\_CURTAIN\_PANEL: CurtainPanel

IfcPlateStandardCase\_Curtain Panel: CurtainPanel

**IfcRailing:** Railing

**IfcRamp:** Ramp

**IfcRampFlight:** Ramp

**IfcRoof:** Roof

**IfcShadingDevice:** GenericModel

**IfcSlab:** Slab

IfcSlab\_ROOF: Roof

IfcSlab\_BASESLAB: StructuralFoundation

IfcSlab\_Roof: Roof

IfcSlab\_Structural Foundation: StructuralFoundation

**IfcSlabType:** Slab

IfcSlabType\_ROOF: Roof

IfcSlabType\_BASESLAB: StructuralFoundation

IfcSlabType\_Roof: Roof



IfcSlabType\_Structural Foundations: StructuralFoundation

**IfcSlabElementedCase:** Slab

IfcSlabElementedCase\_ROOF: Roof

IfcSlabElementedCase\_BASESLAB: StructuralFoundation

IfcSlabElementedCase\_Roof: Roof

IfcSlabElementedCase\_Structural Foundations: StructuralFoundation

**IfcSlabStandardCase:** Slab

IfcSlabStandardCase\_ROOF: Roof

IfcSlabStandardCase\_BASESLAB: StructuralFoundation

IfcSlabStandardCase\_Roof: Roof

IfcSlabStandardCase\_Structural Foundations: StructuralFoundation

**IfcStair:** Stairs

**IfcStairFlight:** Stairs

**IfcWall:** Wall

IfcWall\_Generic Models: GenericModel

**IfcWallElementedCase:** Wall

**IfcWallStandardCase:** Wall

IfcWallStandardCase\_Generic Models: GenericModel

**IfcWindow:** Window

**IfcWindowStandardCase:** Window

**IfcDistributionElement:** SpecialtyEquipment

**IfcDistributionControlElement:** SpecialtyEquipment

IfcDistributionControlElement\_FLOATING: MechanicalControlDevice

**IfcActuator:** SpecialtyEquipment

**IfcAlarm:** SecurityDevices

**IfcController:** SpecialtyEquipment

IfcController\_FLOATING: MechanicalControlDevice

**IfcControllerType:** SpecialtyEquipment

IfcControllerType\_FLOATING: MechanicalControlDevice

**IfcFlowInstrument:** SpecialtyEquipment

**IfcProtectiveDeviceTrippingUnit:** SpecialtyEquipment

**IfcSensor:** SpecialtyEquipment



**IfcUnitaryControlElement:** SpecialtyEquipment  
**IfcDistributionChamberElement:** GenericModel  
**IfcEnergyConversionDevice:** MechanicalEquipment  
**IfcAirToAirHeatRecovery:** MechanicalEquipment  
**IfcBoiler:** MechanicalEquipment  
**IfcBurner:** MechanicalEquipment  
**IfcChiller:** MechanicalEquipment  
**IfcCoil:** MechanicalEquipment  
**IfcCondenser:** MechanicalEquipment  
**IfcCooledBeam:** MechanicalEquipment  
**IfcCoolingTower:** MechanicalEquipment  
**IfcElectricGenerator:** MechanicalEquipment  
**IfcElectricMotor:** MechanicalEquipment  
**IfcEngine:** MechanicalEquipment  
**IfcEvaporativeCooler:** MechanicalEquipment  
**IfcEvaporator:** MechanicalEquipment  
**IfcHeatExchanger:** MechanicalEquipment  
**IfcHumidifier:** MechanicalEquipment  
**IfcMotorConnection:** MechanicalEquipment  
**IfcSolarDevice:** MechanicalEquipment  
**IfcTransformer:** MechanicalEquipment  
**IfcTubeBundle:** MechanicalEquipment  
**IfcUnitaryEquipment:** MechanicalEquipment  
**IfcFlowController:** FlowAccessory  
**IfcFlowControllerType:** FlowAccessory  
**IfcAirTerminalBox:** AirTerminal  
**IfcAirTerminalBoxType:** AirTerminal  
**IfcDamper:** Damper  
**IfcDamperType:** Damper  
**IfcElectricDistributionBoard:** ElectricalEquipment  
**IfcElectricDistributionBoardType:** ElectricalEquipment  
**IfcElectricTimeControl:** ElectricalEquipment  
**IfcElectricTimeControlType:** ElectricalEquipment  
**IfcFlowMeter:** FlowAccessory  
**IfcFlowMeterType:** FlowAccessory  
**IfcProtectiveDevice:** ElectricalEquipment  
**IfcProtectiveDeviceType:** ElectricalEquipment  
**IfcSwitchingDevice:** ElectricalEquipment



**IfcSwitchingDeviceType:** ElectricalEquipment  
**IfcValve:** Valve  
**IfcValveType:** Valve  
**IfcElectricDistributionPoint:** GenericModel  
**IfcFlowMovingDevice:** MechanicalEquipment  
**IfcCompressor:** MechanicalEquipment  
**IfcFan:** MechanicalEquipment  
**IfcPump:** MechanicalEquipment  
**IfcFlowStorageDevice:** SpecialtyEquipment  
**IfcElectricFlowStorageDevice:** SpecialtyEquipment  
**IfcTank:** SpecialtyEquipment  
**IfcFlowTreatmentDevice:** FlowAccessory  
**IfcDuctSilencer:** DuctAccessory  
**IfcFilter:** FlowAccessory  
**IfcInterceptor:** FlowAccessory  
**IfcElementAssembly:** Assembly  
  
IfcElementAssembly\_BEAM\_GRID: StructuralBeamSystem  
  
IfcElementAssembly\_TRUSS: Truss  
  
IfcElementAssembly\_Structural Beam Systems: StructuralBeamSystem  
  
IfcElementAssembly\_Structural Trusses: Truss  
**IfcBuildingElementPart:** Part  
  
IfcBuildingElementPart\_Generic Models: GenericModel  
  
IfcBuildingElementPart\_Structural Framing: Beam  
**IfcDiscreteAccessory:** DiscreteAccessory  
**IfcDiscreteAccessoryType:** DiscreteAccessory  
**IfcFastener:** Fastener  
**IfcFastenerType:** Fastener  
**IfcMechanicalFastener:** Fastener  
**IfcMechanicalFastenerType:** Fastener  
**IfcReinforcingBar:** StructuralRebar  
**IfcReinforcingMesh:** StructuralRebar  
**IfcTendon:** Tendon  
**IfcTendonType:** Tendon  
**IfcTendonAnchor:** Tendon



**IfcTendonAnchorType:** Tendon

**IfcEquipmentElement:** SpecialtyEquipment

IfcEquipmentElement\_FLOATING: MechanicalControlDevice

IfcEquipmentElement\_BATH: PlumbingEquipment

**IfcFurnishingElement:** Furniture

**IfcFurniture:** Furniture

**IfcSystemFurnitureElement:** FurnitureSystem

**IfcTransportElement:** Transport

**IfcTransportElementType:** Transport

**IfcGrid:** Empty

**IfcFlowFitting:** FlowFitting

IfcFlowFitting\_Cable Tray Fitting: CableTrayFitting

IfcFlowFitting\_Conduit Fitting: ConduitFitting

IfcFlowFitting\_Duct Fitting: DuctFitting

IfcFlowFitting\_Pipe Fitting: PipeFitting

**IfcFlowFittingType:** FlowFitting

IfcFlowFittingType\_Cable Tray Fitting: CableTrayFitting

IfcFlowFittingType\_Conduit Fitting: ConduitFitting

IfcFlowFittingType\_Duct Fitting: DuctFitting

IfcFlowFittingType\_Pipe Fitting: PipeFitting

**IfcCableCarrierFittingType:** CableTrayFitting

IfcCableCarrierFittingType\_Conduit Fitting: ConduitFitting

**IfcCableCarrierFitting:** CableTrayFitting

IfcCableCarrierFitting\_Conduit Fitting: ConduitFitting

**IfcCableFitting:** ConduitFitting

IfcCableFitting\_Cable Tray Fitting: CableTrayFitting

IfcCableFitting\_Conduit Fitting: ConduitFitting

**IfcDuctFittingType:** DuctFitting

**IfcDuctFitting:** DuctFitting

**IfcJunctionBoxType:** ElectricalFixture

**IfcJunctionBox:** ElectricalFixture





**IfcPipeFittingType:** PipeFitting

**IfcPipeFitting:** PipeFitting

**IfcFlowSegment:** FlowSegment

IfcFlowSegment\_Cable Tray: CableTray

IfcFlowSegment\_Conduit: Conduit

IfcFlowSegment\_Duct: Duct

IfcFlowSegment\_Flex Duct: FlexDuct

IfcFlowSegment\_Pipe: Pipe

**IfcFlowSegmentType:** FlowSegment

IfcFlowSegmentType\_Cable Tray: CableTray

IfcFlowSegmentType\_Conduit: Conduit

IfcFlowSegmentType\_Duct: Duct

IfcFlowSegmentType\_Flex Duct: FlexDuct

IfcFlowSegmentType\_Pipe: Pipe

**IfcCableCarrierSegment:** CableTray

IfcCableCarrierSegment\_CONDUITSEGMENT: Conduit

IfcCableCarrierSegment\_Conduit: Conduit

**IfcCableCarrierSegmentType:** CableTray

IfcCableCarrierSegmentType\_CONDUITSEGMENT: Conduit

IfcCableCarrierSegmentType\_Conduit: Conduit

**IfcCableSegment:** Conduit

**IfcCableSegmentType:** Conduit

**IfcDuctSegment:** Duct

IfcDuctSegment\_FLEXIBLESEGMENT: FlexDuct

**IfcDuctSegmentType:** Duct

IfcDuctSegmentType\_FLEXIBLESEGMENT: FlexDuct

**IfcPipeSegment:** FlexPipe

IfcPipeSegment\_FLEXIBLESEGMENT: FlexPipe



IfcPipeSegment\_Flex Pipes: FlexPipe

**IfcPipeSegmentType:** Pipe

IfcPipeSegmentType\_FLEXIBLESEGMENT: FlexPipe

**IfcFlowTerminal:** FlowTerminal

IfcFlowTerminal\_Air Terminal: AirTerminal

IfcFlowTerminal\_Electrical Equipment: ElectricalEquipment

IfcFlowTerminal\_Electrical Fixture: ElectricalFixture

IfcFlowTerminal\_Lighting Fixture: LightingFixture

IfcFlowTerminal\_Plumbing Fixture: PlumbingFixture

IfcFlowTerminal\_Sprinkler: Sprinkler

**IfcFlowTerminalType:** FlowTerminal

IfcFlowTerminalType\_Air Terminal: AirTerminal

IfcFlowTerminalType\_Electrical Equipment: ElectricalEquipment

IfcFlowTerminalType\_Electrical Fixture: ElectricalFixture

IfcFlowTerminalType\_Lighting Fixture: LightingFixture

IfcFlowTerminalType\_Plumbing Fixture: PlumbingFixture

IfcFlowTerminalType\_Sprinkler: Sprinkler

**IfcAirTerminalType:** AirTerminal

**IfcAirTerminal:** AirTerminal

**IfcAudioVisualApplianceType:** AudioVisualDevice

**IfcAudioVisualAppliance:** AudioVisualDevice

**IfcCommunicationsAppliance:** CommunicationDevices

IfcCommunicationsAppliance\_ANTENNA: DataDevice

**IfcCommunicationsApplianceType:** CommunicationDevices

IfcCommunicationsApplianceType\_ANTENNA: DataDevice

**IfcElectricApplianceType:** ElectricalFixture

IfcElectricApplianceType\_DISHWASHER: PlumbingFixture

IfcElectricApplianceType\_FREEZER: SpecialtyEquipment

IfcElectricApplianceType\_FRIDGE\_FREEZER: SpecialtyEquipment



IfcElectricApplianceType\_MICROWAVE: SpecialtyEquipment  
IfcElectricApplianceType\_REFRIGERATOR: SpecialtyEquipment  
IfcElectricApplianceType\_TELEPHONE: TelephoneDevice  
IfcElectricApplianceType\_COMPUTER: DataDevice  
IfcElectricApplianceType\_Data Devices: DataDevice  
**IfcElectricAppliance**: ElectricalFixture  
IfcElectricAppliance\_DISHWASHER: PlumbingFixture  
IfcElectricAppliance\_FREEZER: SpecialtyEquipment  
IfcElectricAppliance\_FRIDGE\_FREEZER: SpecialtyEquipment  
IfcElectricAppliance\_MICROWAVE: SpecialtyEquipment  
IfcElectricAppliance\_REFRIGERATOR: SpecialtyEquipment  
IfcElectricAppliance\_TELEPHONE: TelephoneDevice  
IfcElectricAppliance\_COMPUTER: DataDevice  
IfcElectricAppliance\_Data Devices: DataDevice  
**IfcElectricHeaterType**: ElectricalFixture  
**IfcFireSuppressionTerminal**: FireProtection  
IfcFireSuppressionTerminal\_SPRINKLER: Sprinkler  
**IfcFireSuppressionTerminalType**: FireProtection  
IfcFireSuppressionTerminalType\_SPRINKLER: Sprinkler  
**IfcGasTerminalType**: SpecialtyEquipment  
**IfcLampType**: LightingDevice  
**IfcLamp**: LightingDevice  
**IfcLightFixtureType**: LightingFixture  
**IfcLightFixture**: LightingFixture  
**IfcMedicalDeviceType**: MedicalEquipment  
**IfcMedicalDevice**: MedicalEquipment  
**IfcOutletType**: ElectricalFixture  
**IfcOutlet**: ElectricalFixture  
**IfcSanitaryTerminalType**: PlumbingFixture  
IfcSanitaryTerminalType\_BATH: PlumbingEquipment  
**IfcSanitaryTerminal**: PlumbingFixture



IfcSanitaryTerminal\_BATH: PlumbingEquipment

**IfcSpaceHeater:** GenericModel

**IfcStackTerminalType:** GenericModel

**IfcStackTerminal:** GenericModel

**IfcWasteTerminalType:** GenericModel

**IfcWasteTerminal:** GenericModel

**IfcGeographicElementType:** GenericModel

**IfcGeographicElement:** GenericModel

IfcGeographicElement\_TERRAIN: Toposolid

**IfcCivilElementType:** GenericModel

**IfcCivilElement:** GenericModel

**IfcAnalyticalMember:** Analytical

**IfcAnalyticalMemberType:** Analytical

**IfcAnalyticalPanel:** Analytical

**IfcAnalyticalPanelType:** Analytical

## Appendix 2 - Bexel Manager Categories

Abutment

BridgeFraming

ExpansionJoints

Pier

StructuralTendons

VibrationManagement

AudioVisualDevice

FireProtection

FoodServiceEquipment

Hardscape

MedicalEquipment

Signage

TemporaryStructure

VerticalCirculation

Bearing

BridgeCable

BridgeDeck



Road  
Zone  
MechanicalControlDevice  
PlumbingEquipment  
Analytical  
DataDevice  
FabricationDuctworkStiffener  
StructuralBeamSystem  
StructuralFabricArea  
StructuralFabricReinforcement  
StructuralFraming  
Toposolid  
Truss  
Wall  
Window  
Door  
Slab  
Ceiling  
Roof  
Column  
Ramp  
Stairs  
Railing  
Furniture  
Casework  
AirTerminal  
Pipe  
FlexPipe  
PipeFitting  
Duct  
FlexDuct  
DuctFitting  
PlumbingFixture  
SpecialtyEquipment  
MechanicalEquipment  
Parking  
CurtainPanel  
CurtainWallMullion



StructuralFoundation  
StructuralColumn  
Beam  
Space  
WallSweep  
GenericModel  
Wire  
ElectricalEquipment  
Sprinkler  
PipeAccessory  
DuctAccessory  
LightingDevice  
TelephoneDevice  
LightingFixture  
ElectricalFixture  
CurtainWall  
CableTray  
CableTrayFitting  
Conduit  
ConduitFitting  
Planting  
Part  
FireAlarmDevice  
Mass  
CommunicationDevices  
SecurityDevices  
StructuralRebar  
FurnitureSystem  
CurtainSystem  
StructuralConnection  
Covering  
Insulation  
Member  
Assembly  
FlowSegment  
FlowAccessory  
FlowTerminal  
FlowFitting



Valve  
Damper  
Tendon  
Fastener  
Plate  
Transport  
DiscreteAccessory  
Site

