

Revit Kepler API

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DevDays 2015-2016

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Rice – Must Do



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Rice | Visual Studio & .NET

.NET 4.5.2

- All Revit API binaries are now built targeting .NET 4.5.2

Visual Studio 2015

- Revit builds with and installs runtime libraries from the **Visual C++ Redistributable for Visual Studio 2015**
- No guarantee that Revit will install any other runtime on client machines

Rice | Add-In Security

Code Signing for Add-Ins

- To help Revit customers understand the origin of code running on their system, Revit now checks the code signing status of all add-ins during load
- A message is displayed for each add-in displaying the status of the security certificate (if any)
- **The Revit team highly encourages signing all add-ins**
- The message can be bypassed by adding certificate(s) to certificate store



Rice | Transaction Changes

- **TransactionMode.Automatic** obsoleted
- Use the Transaction APIs to manage required transactions
 - Manual mode when making changes to the Revit model
 - ReadOnly mode for commands that do not change to the model



Rice | Application API Changes

- Removed default constructor for
Autodesk.Revit.ApplicationServices.Application
- Obtain Application from arguments passed to Revit API
callback, e.g.:
 - UIApplication via ExternalCommandData
 - Document via UpdaterData
 - Event arguments
- Not available in IExternalApplication callbacks
(OnStartup() and OnShutdown())
 - Use ControlledApplication instead
 - Use ApplicationInitialized event to work with docs after startup



Rice | Point Cloud API Changes

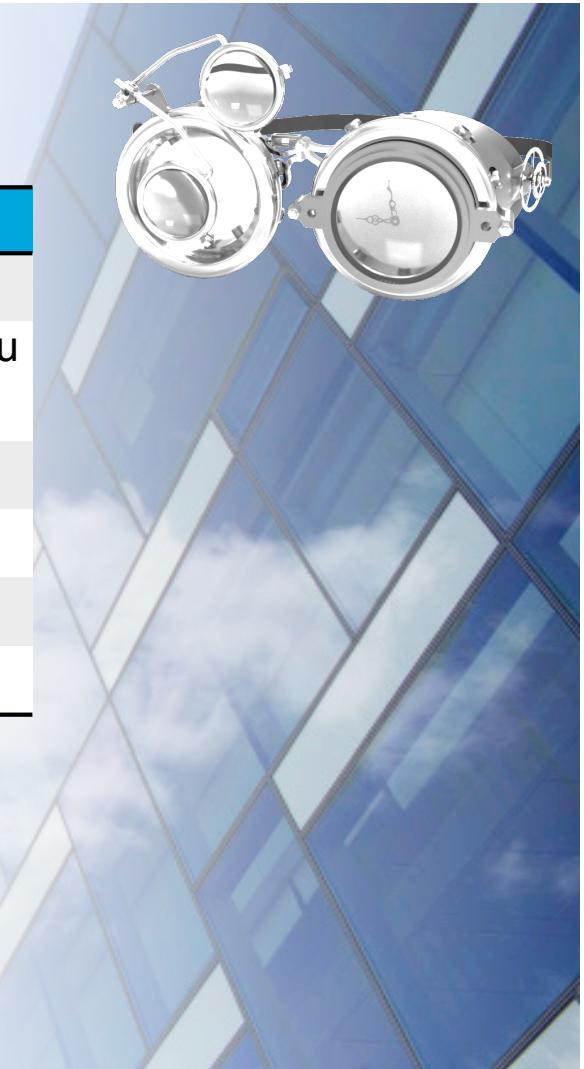
- **PointCloudOverrides**
 - **Get/SetPointCloudOverrideSettings()** methods replaced with
Get/SetPointCloudScanOverrideSettings()
 - New functions
Get/SetPointCloudRegionOverrideSettings() support region overrides



Rice | MEP Systems

| Deprecated | Replacement |
|---------------------------------|--------------------------------------|
| MechanicalSystem.Flow | MechanicalSystem.GetFlow() |
| MechanicalSystem.StaticPressure | MechanicalSystem.GetStaticPressure() |
| PipingSystem.FixtureUnits | PipingSystem.GetFixtureUnits() |
| PipingSystem.Flow | PipingSystem.GetFlow() |
| PipingSystem.StaticPressure | PipingSystem.GetStaticPressure() |
| N/A | PipingSystem.GetVolume() |

- **These values are now calculated asynchronously**
- To handle asynchronous calculation results, define callback methods to react when result is available
- If no callback defined, the calculation becomes synchronous
- Associated built-in parameters are still supported
- These parameters no longer support dynamic model update



Rice | Obsolete API Removal

- All APIs marked as deprecated in Revit 2016 have been removed



Wine – New Functionality



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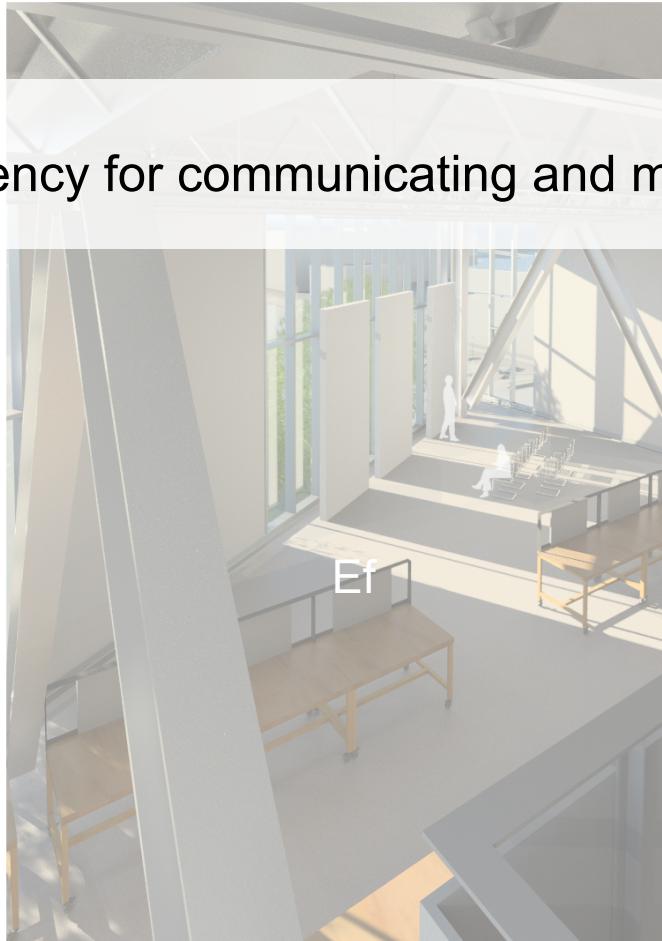
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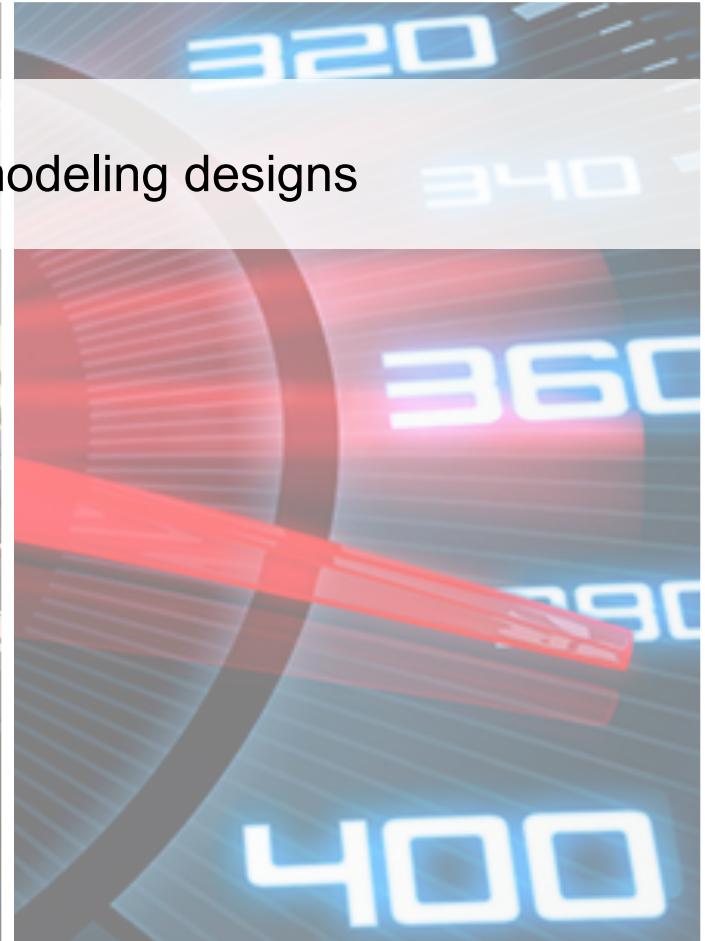
Efficiency for communicating and modeling designs



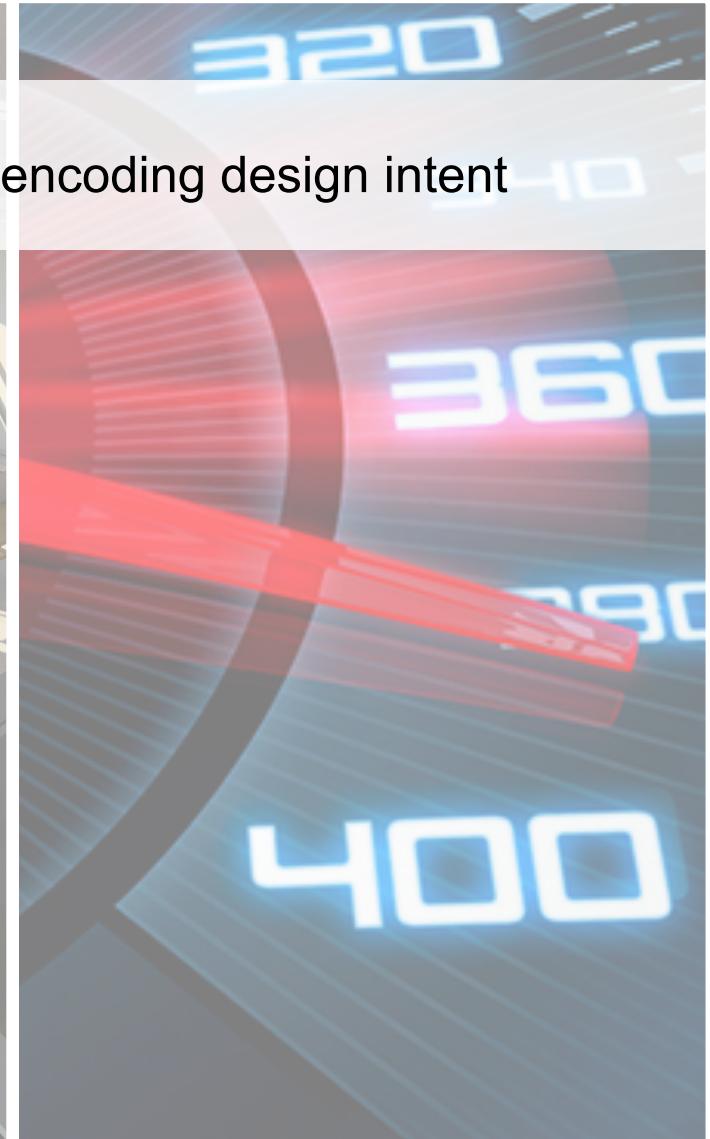
Modeling



Communication



Efficiency

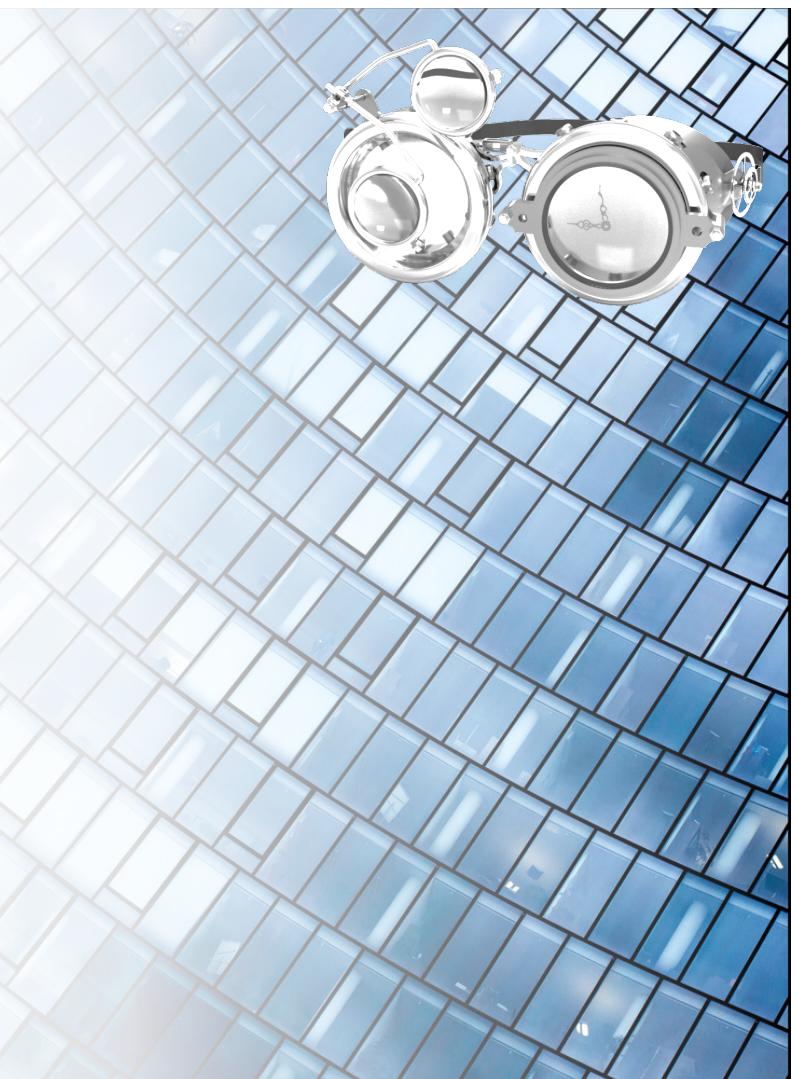
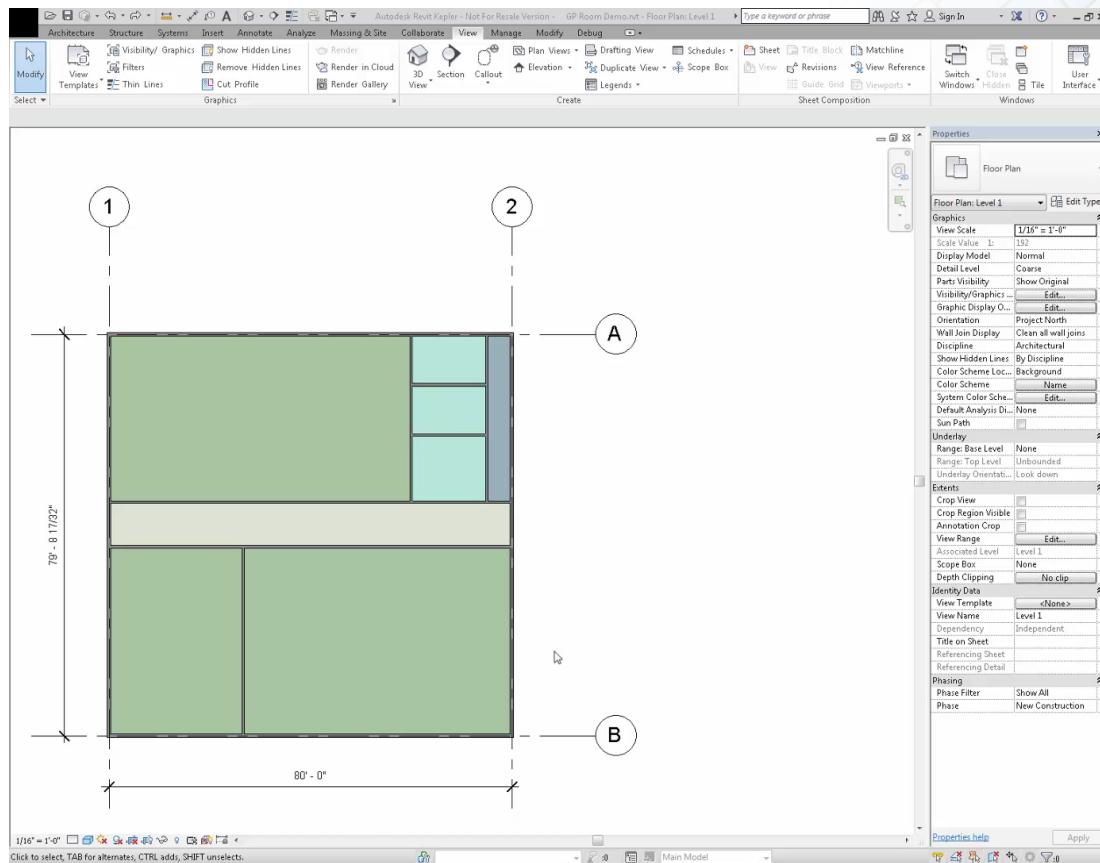


Modeling | Global Parameters

- Global Parameters enable the capture of design intent by bringing the parametric power of families into the project environment
- GPs can:
 - Drive and measure dimensions and constraints
 - Use formulas for complex calculations
 - Drive parameter values of instances and types in the project



Modeling | Global Parameters



Modeling | Global Parameters

- **GlobalParameterManager**
 - Manage Global Parameters (GPs) in a project
- **GlobalParameter**
 - Project-wide parameter with value
 - Value can be driven by a dimension, a formula, or explicitly defined
 - **IsReporting/IsDrivenbyDimension** – is measuring/driving a dimension
 - **GetAffectedElements()** – elements driven in any way by this GP



Modeling | Parameters

- **ParameterValue**

- Contains a value of a corresponding global parameter
- Derived classes for **Integer**, **Double**, **String**, **ElementId**, and **Null**
- All derived classes have one property: **Value**

- **Parameter**

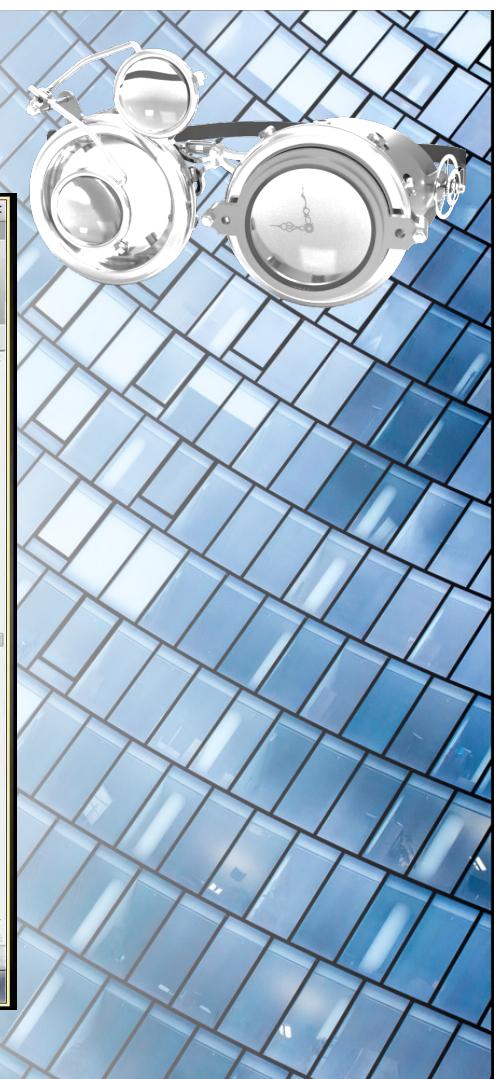
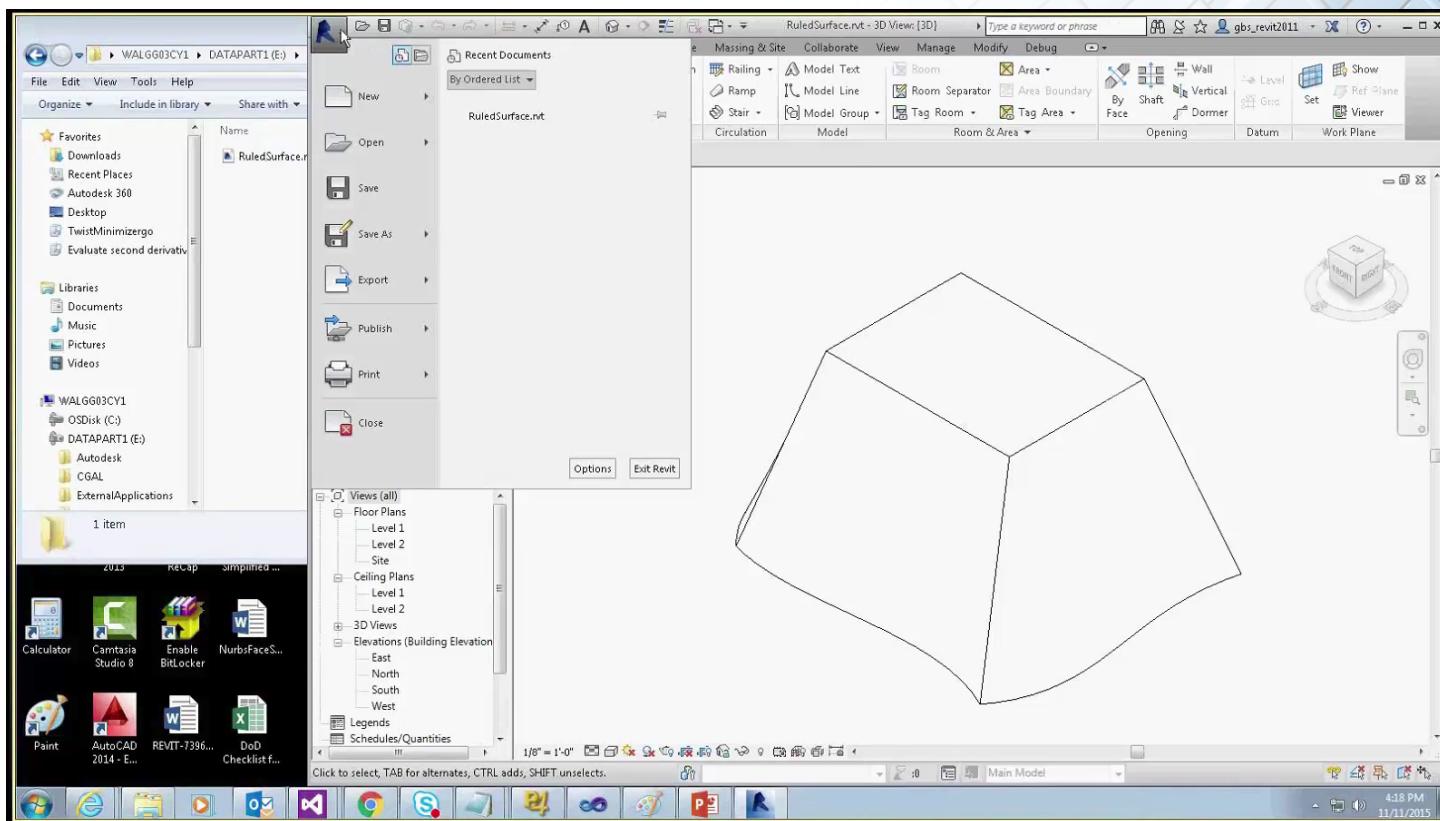
- **AssociateWithGlobalParameter()** makes a GP drive the parameter value of an element

- **ParameterType**

- **MultilineText** – enables creation and use of multiline text parameters



Modeling | IFC4



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Modeling | Geometry API

- **ShapeImporter**
 - **ShapeImporter.Convert()** conversion of geometry, materials, and graphics styles stored in external formats (e.g. SAT and Rhino) into Revit geometry objects
- **BRepBuilder**
 - Create Revit geometry (either solids or "open sheets") from input surface, edges, and boundary loops
 - Use directly in any other Revit tool that accepts geometry, including **DirectShape**
- **DirectShape.IsValidCategoryId()**
 - now correctly lists categories approved for use with DirectShape



Modeling | Geometry API Continued

- **Surface**

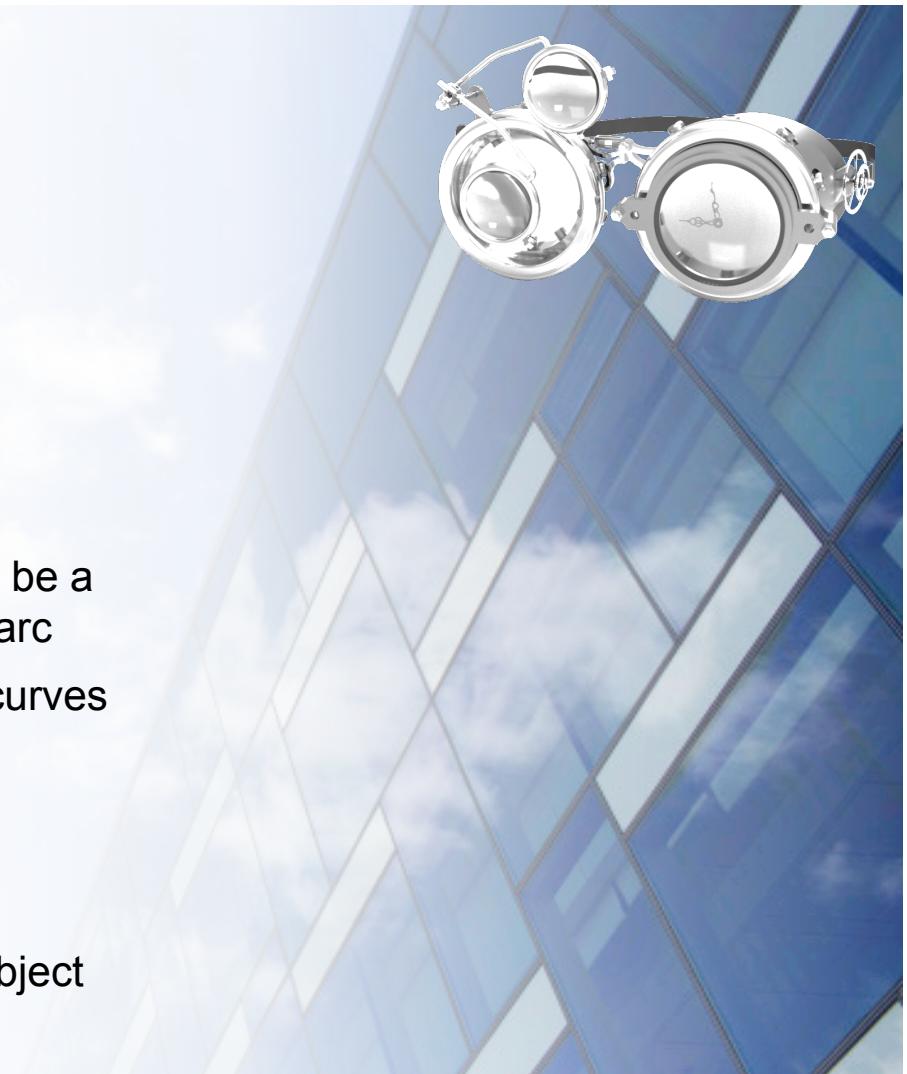
- New subclasses: **Cylindrical, Conical, Ruled, Revolved, Hermite**
- **Plane.CreateByThreePoints()**

- **NurbSpline**

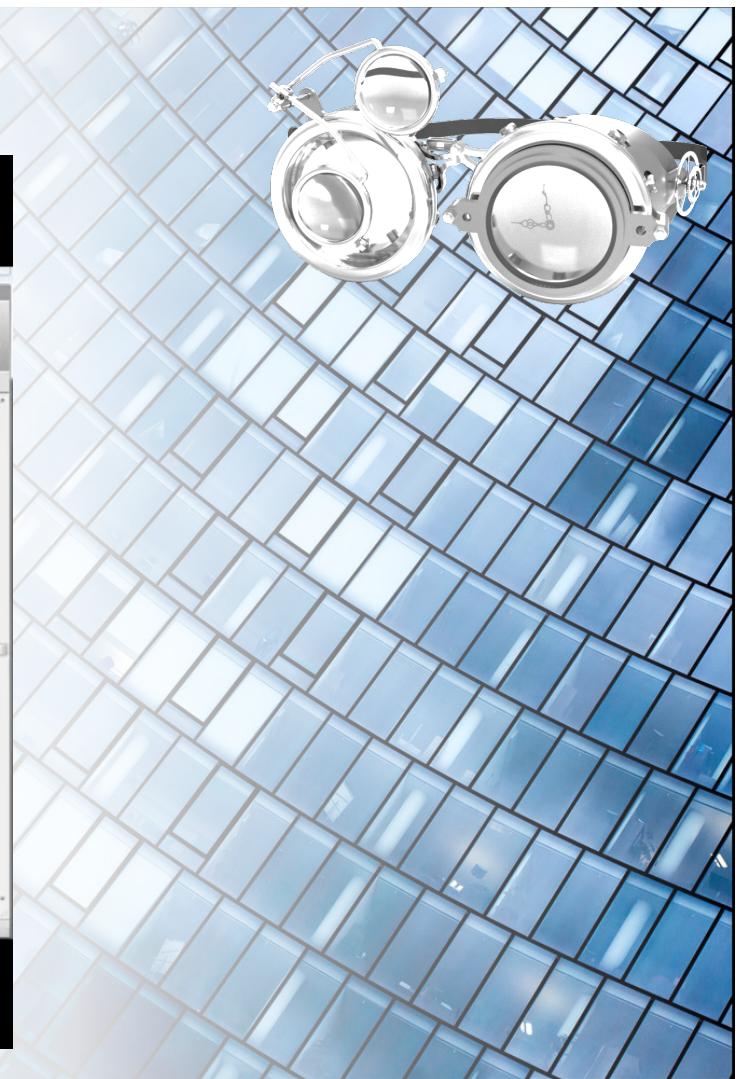
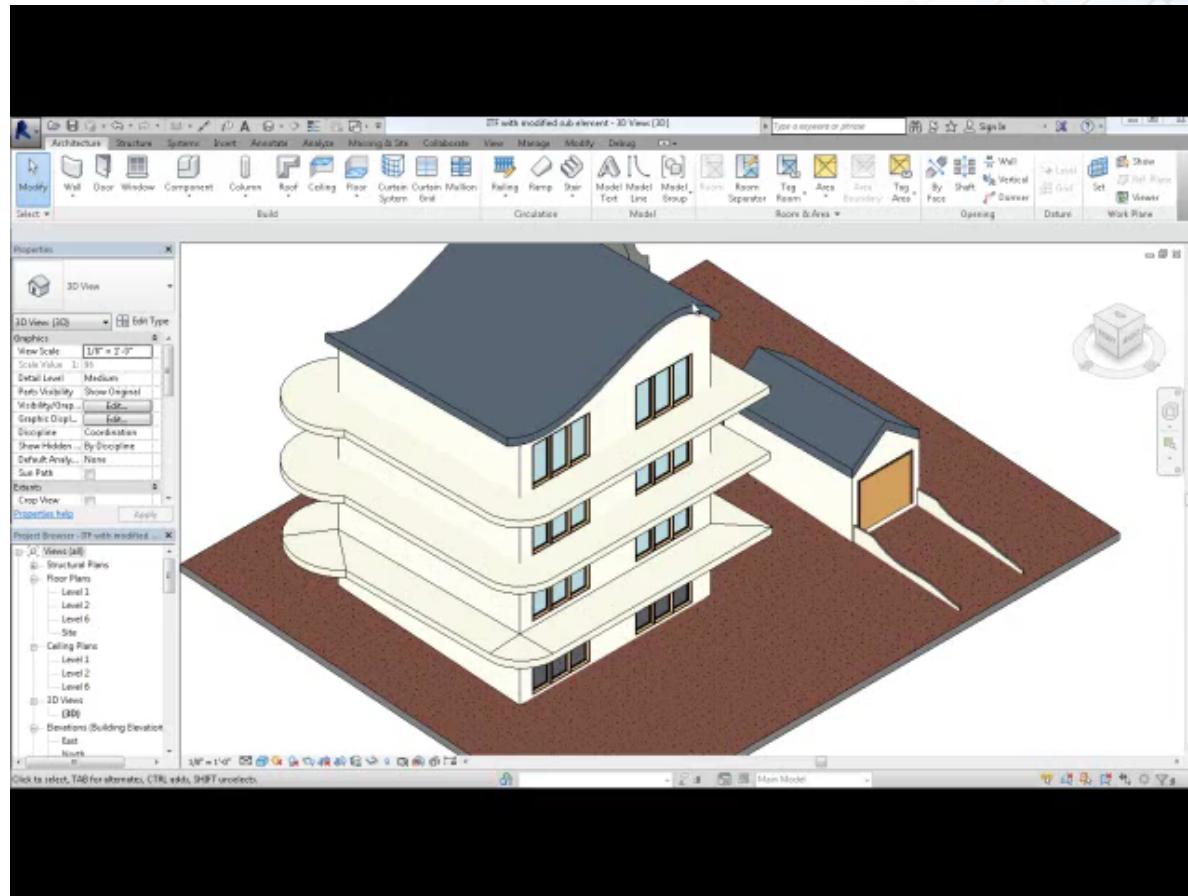
- Curve returned by **new creation methods** may be a NURBSpline or a simpler curve such as line or arc
- Revit uses simplest possible representation of curves

- **TessellatedShapeBuilder**

- **Build()** no longer returns build results, use **GetBuildResult()** instead
- Set build options on TessellatedShapeBuilder object



Modeling | Hosted Railings



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Modeling | Railing API

- **BaseRailing**

- **Create()**

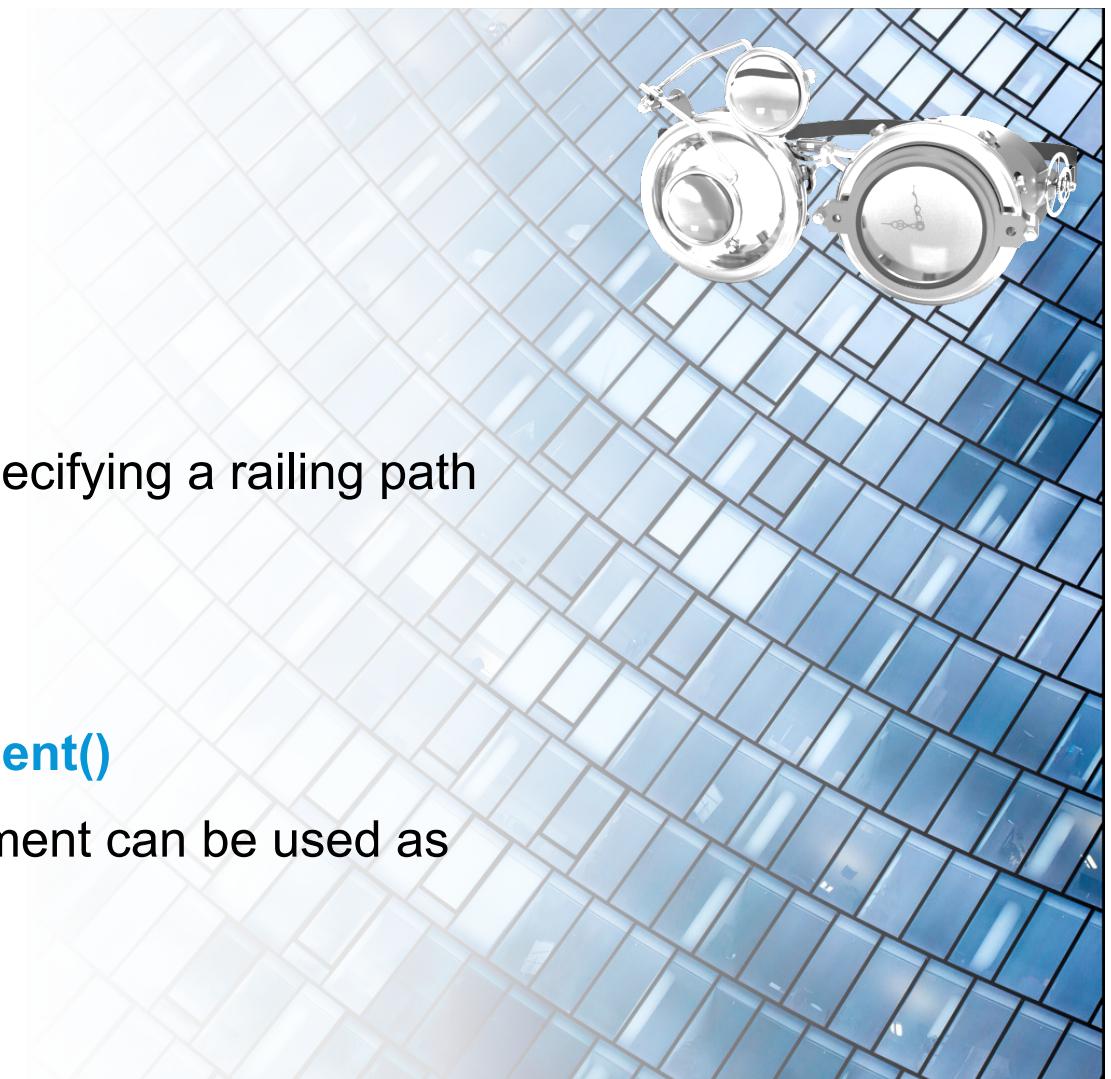
- Creates a new railing by specifying a railing path

- **SetPath()**

- Sets the railing path

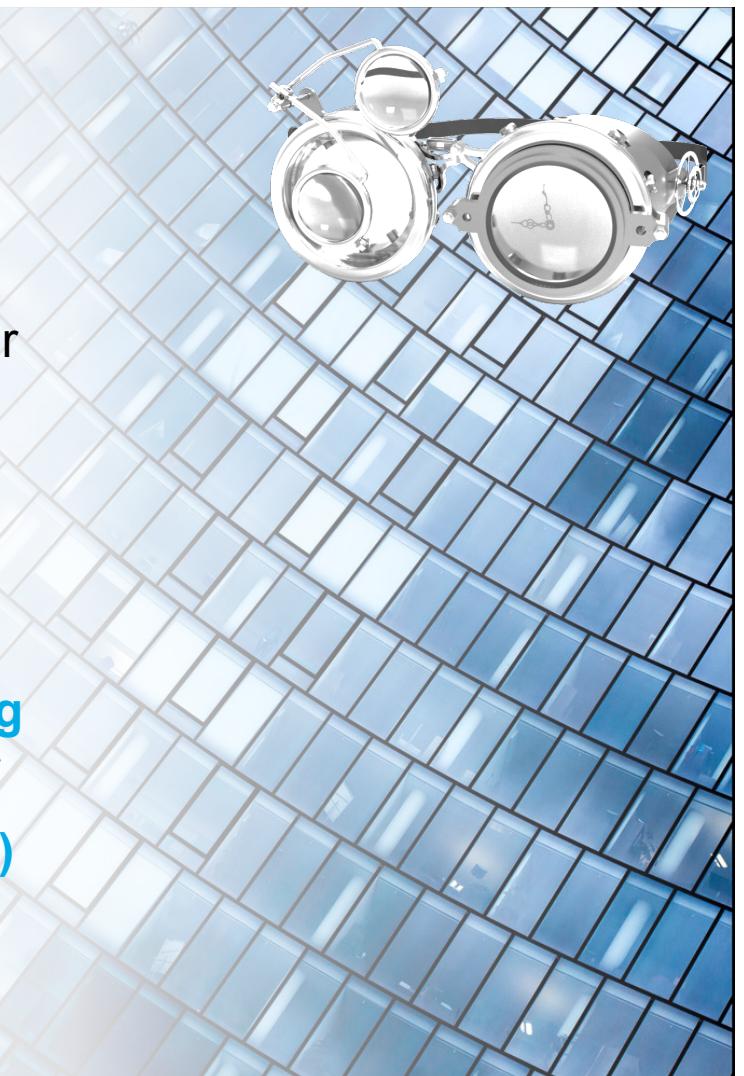
- **RailingCanBeHostedByElement()**

- Checks if the specified element can be used as a railing host



Modeling | Reinforcement - Fabric Sheets

- **FabricSheet** numbering and segment control
 - **FabricNumber** reinforcement numbering value for the fabric sheet
 - New methods to identify and specify segment length(s)
- Fabric sheet layout control
 - **FabricSheetLayoutPattern.QuantitativeSpacing** specifies a layout based on spacing and diameter
 - **FabricSheetType.SetLayoutAsCustomPattern()** uses **FabricWireItems** (single wires) to specify a custom layout



Modeling | Reinforcement - Rebar Container

- **RebarContainer**

- **SetItemHiddenStatus() / IsItemHidden()**

provide access to the option to hide an individual RebarContainerItem in a given view

- **PresentItemsAsSubelements**

identifies if Items should be presented in schedules and tags as separate sub-elements



Modeling | Structural Connections

▪ **StructuralConnectionHandler**

- Defines a connection between a set of elements
- Participating categories: structural framing, columns, walls, floors, and foundations
- **GetOrigin** specifies the connection's origin
- **SetDefaultPrimaryElement** defines primary element in the connection



Modeling | MEP Fabrication

- **FabricationSettings**

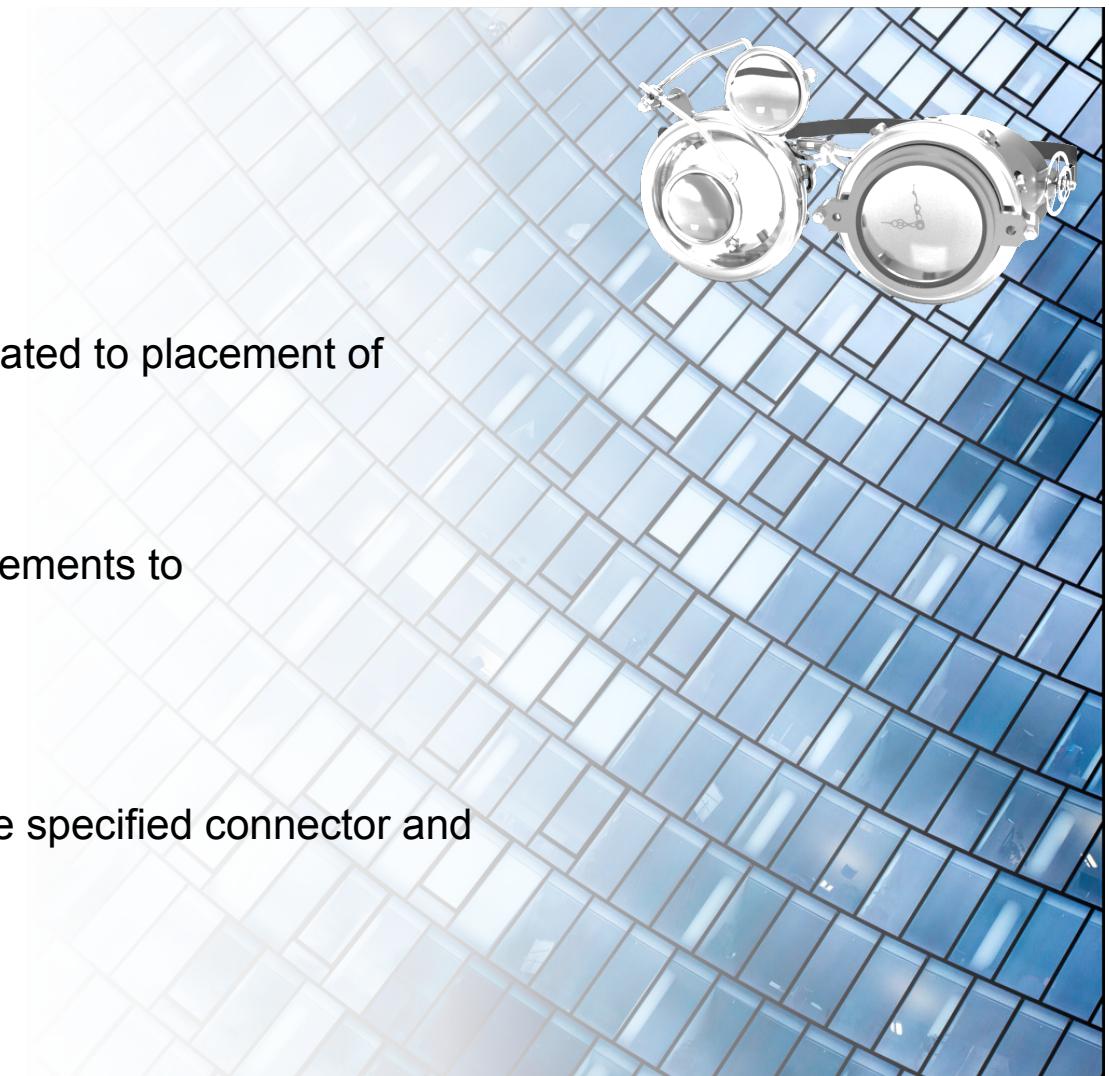
- Exposes user-specifiable settings related to placement of FabricationParts

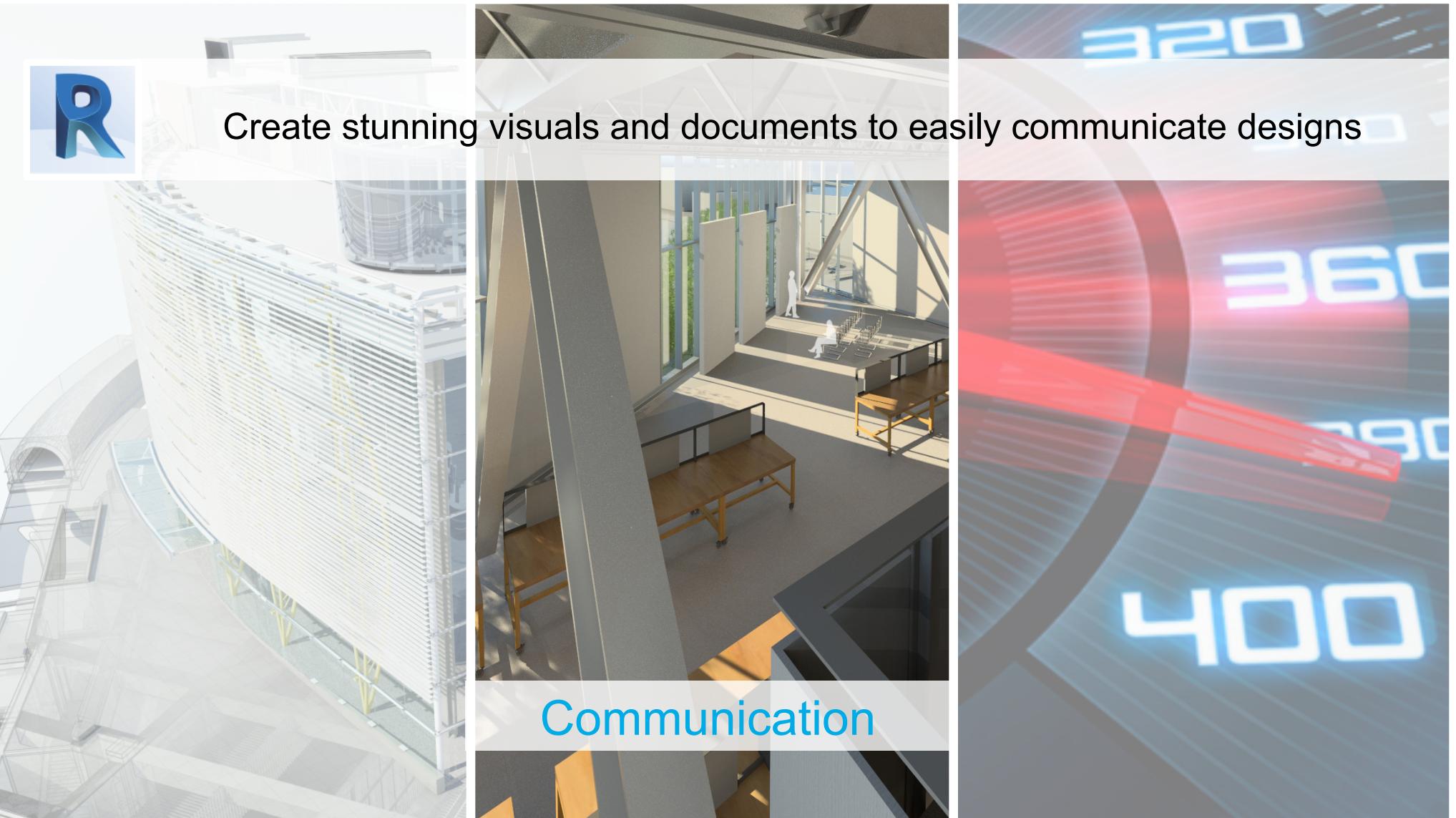
- **DesignToFabricationConverter**

- Supports the conversion of design elements to FabricationParts

- **FabricationPart**

- **StretchAndFit()**
stretches the fabrication part from the specified connector and fits to the target routing end
 - **~40 other properties & methods**





Communication | Autodesk RayTracer



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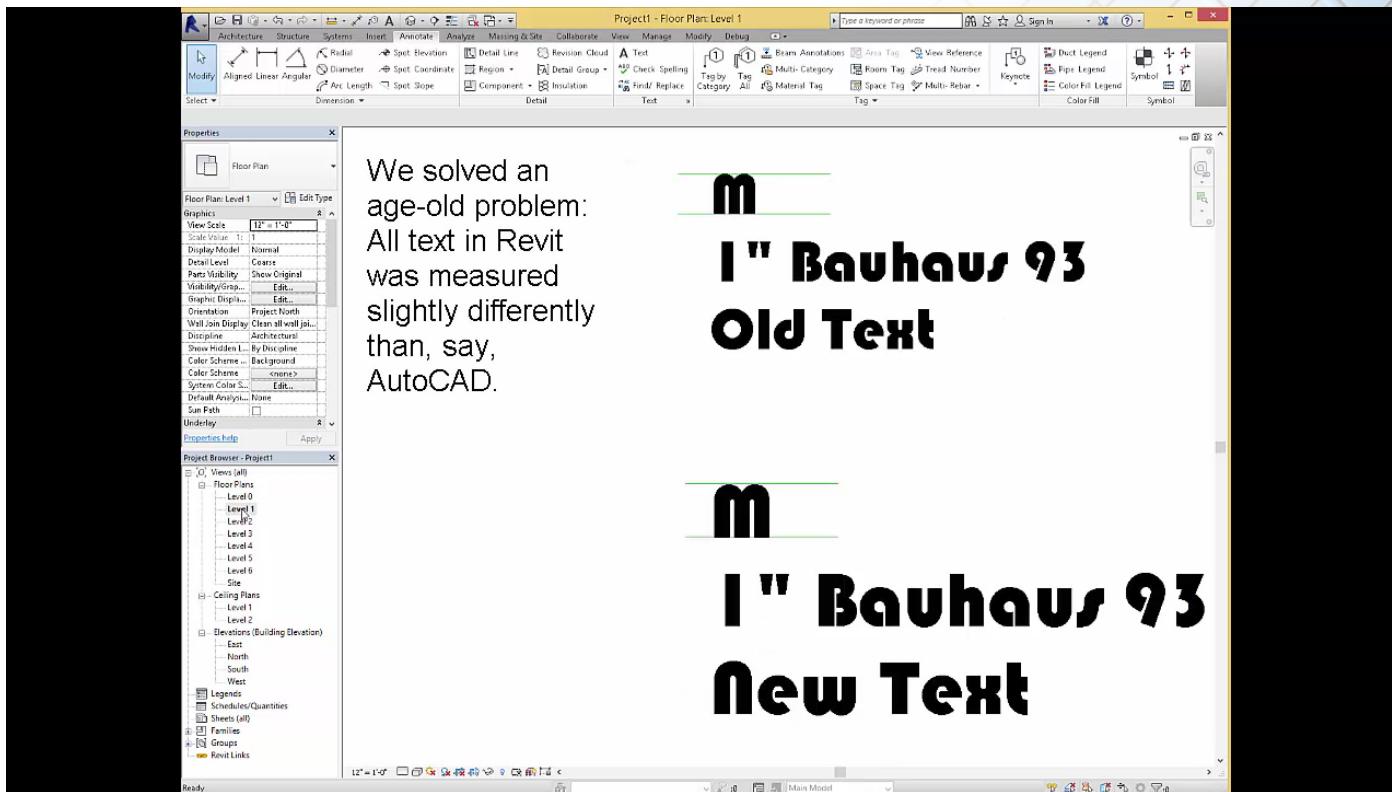
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Communication | Rendering API

- Autodesk RayTracer is replacing MentalRay
- Some settings are removed
- New enums:
 - **RenderDuration**
 - **LightAndMaterialAccuracyMode**
- **RenderingQualitySettings** are redesigned



Communication | Updated Text Editor

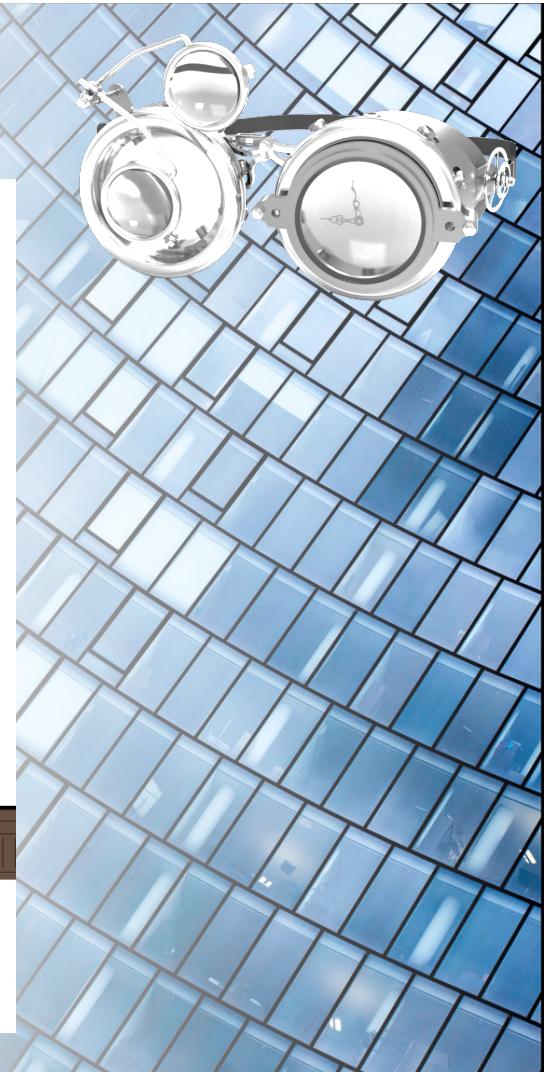


Communication | Text

- Upgrade from 2016 will modify existing text notes
- FormattedText
 - Read and write text and formatting of a text note
 - Obtained via **TextNote.Get/SetFormattedText()**
 - Access text & formatting for whole text note or a range via class **TextRange**
- TextEditorOptions
 - Control Revit's Text Editor appearance and functionality



Communication | Depth Cueing



Communication | Depth Cueing

- **ViewDisplayDepthCueing**

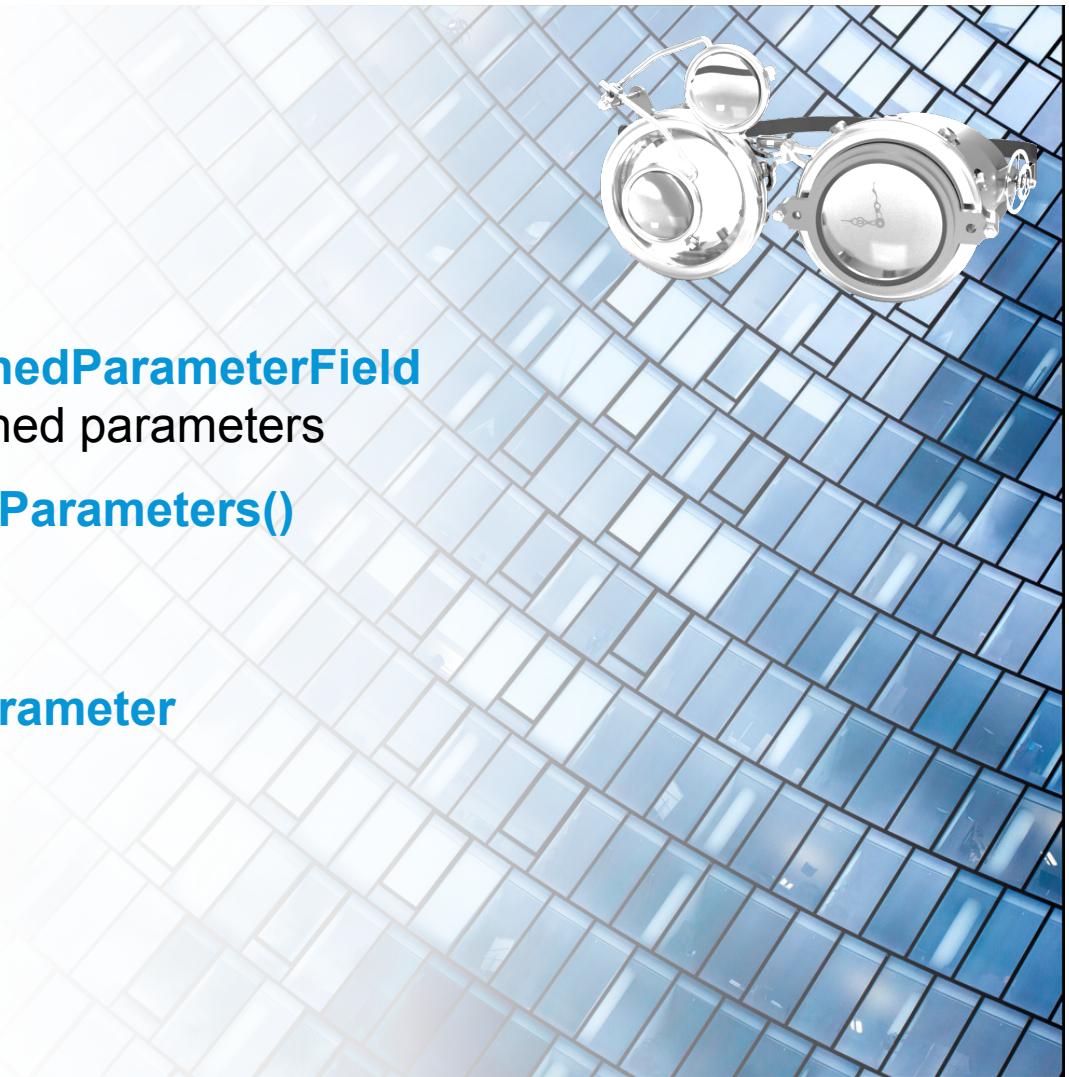
- Fade line and surface display intensity between front and back clip plane of a view
- **EnableDepthCueing** enables/disables depth cueing
- **StartPercentage / EndPercentage** - percentage offset from front clip plane where fade begins/ends
- **FadeTo** defines the maximum fade percentage

- **View class**

- **Get/SetDepthCueing()**
depth cueing settings for a view

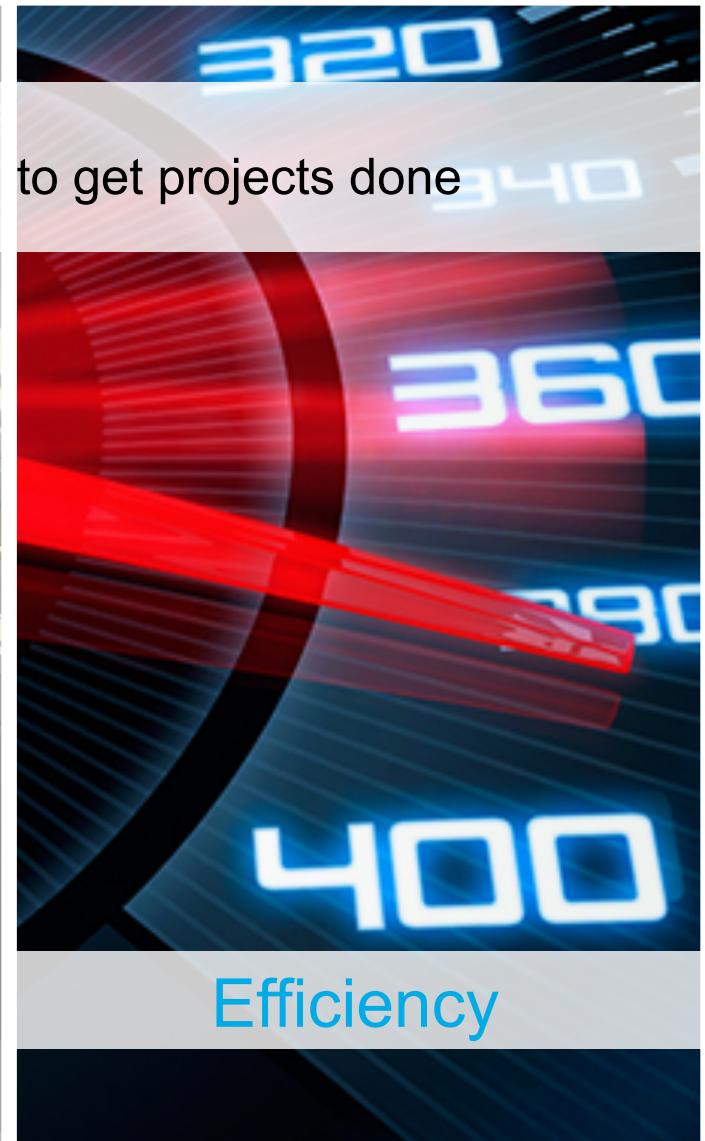
Communication | Schedules

- Concatenated schedule fields
 - **ScheduleDefinition.InsertCombinedParameterField** inserts a schedule field with combined parameters
 - **ScheduleField.Get/SetCombinedParameters()** defines combined parameter fields
 - Enum value
ScheduleFieldType.CombinedParameter





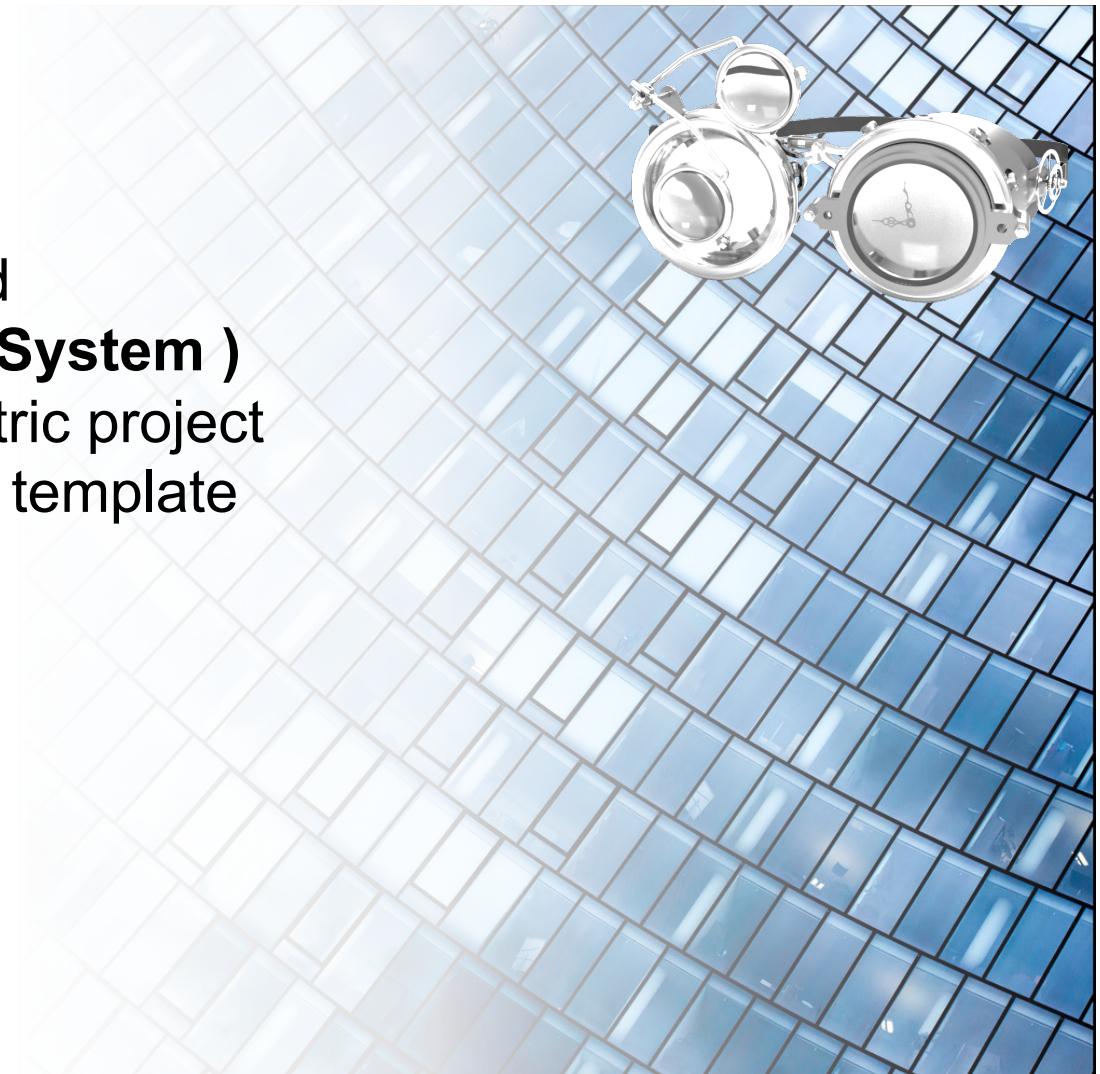
Leverage the power of the best BIM tool to get projects done



Efficiency

Efficiency | New Document

- The new **Application** method
NewProjectDocument(UnitSystem)
creates a new imperial or metric project document without a specified template



Efficiency | Revit Link API

- Link instance locations
 - **MoveBasePointToHostBasePoint()**
moves RevitLinkInstance so that the link & host base points coincide
 - **MoveOriginToHostOrigin()**
one time move that aligns internal origins of the linked document and host document
- Local unload of Revit Links
 - **UnloadLocally()**
unload a Revit link for the current user only without affecting other users
 - **RevertLocalUnloadStatus()**
removes a user's local link override

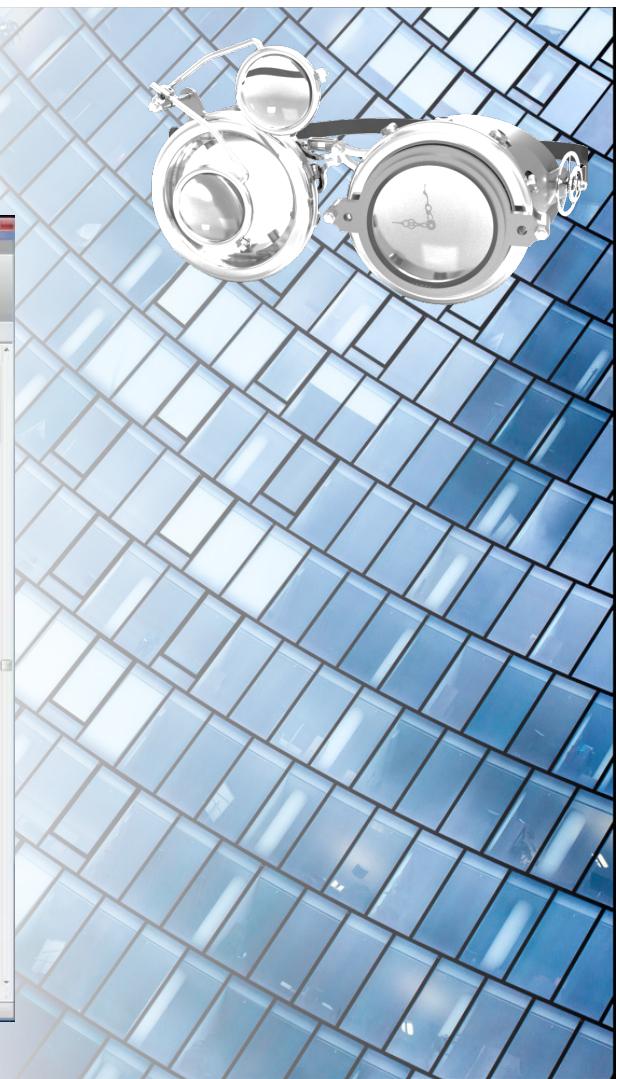
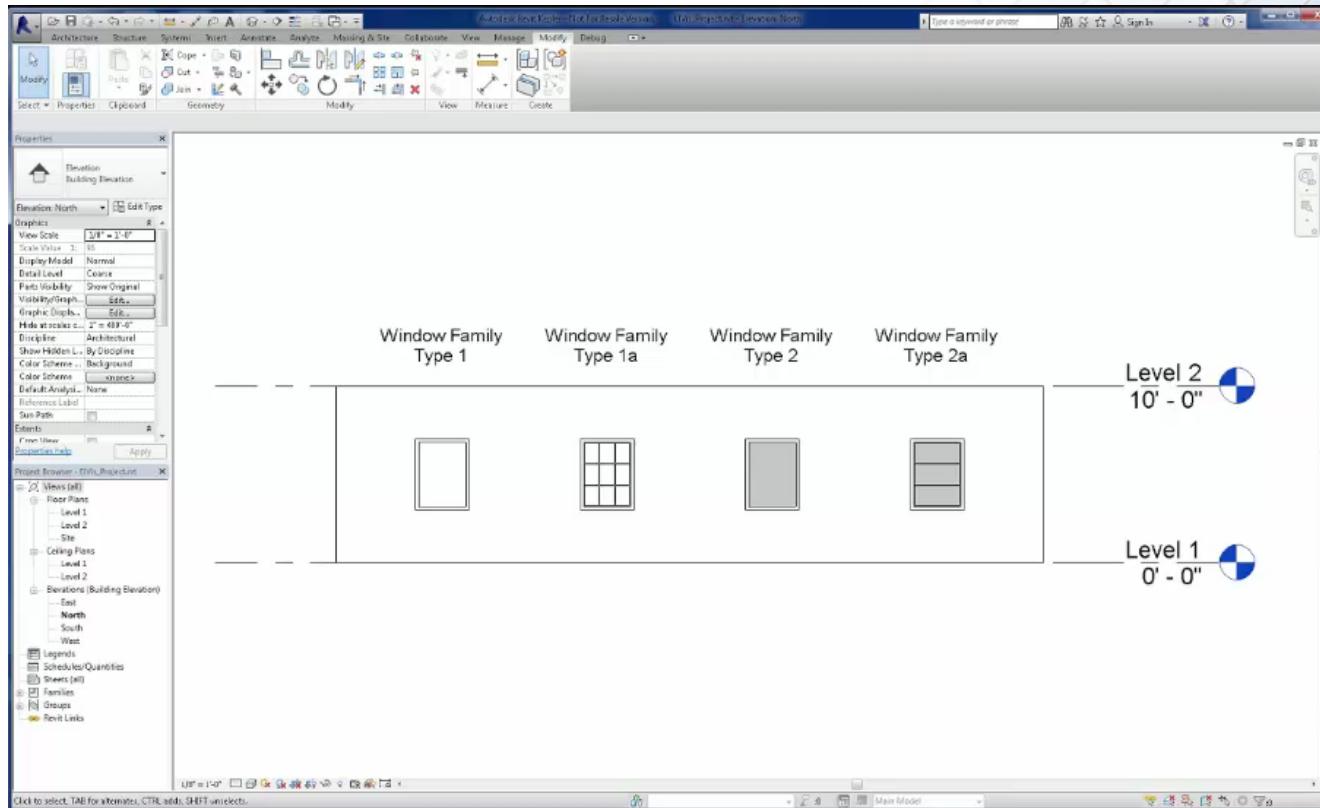


Efficiency | Family API

- **PromptForFamilyInstancePlacement()** options
 - **SketchGalleryOptions**
control types of sketched curves which can be used for a curve-based family
 - **FaceBasedPlacementType**
options for placement of a face-based family
- **FamilyInstance.CanSplit/Split()**
 - split a curve-driven family instance



Efficiency | Family Preview Visibility

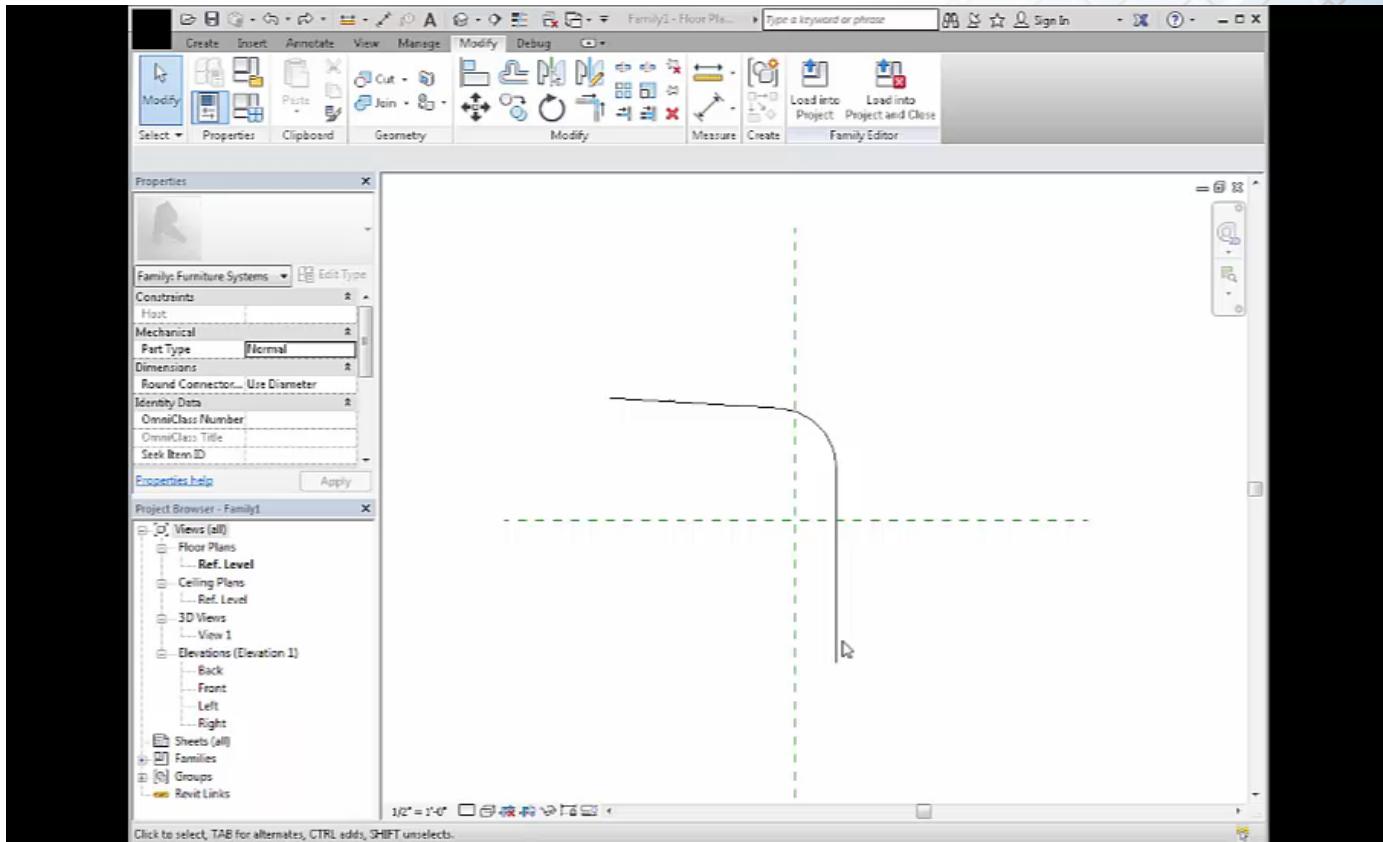


Efficiency | View API

- Temporary view modes
 - New class **TemporaryViewModes**
 - Identify and control on/off state of temporary view modes
- Plan view underlay
 - Full access to underlay levels and settings via **View**
- Dependent views
 - **View.ConvertToIndependent()**
- Assembly view creation with template information
 - **AssemblyViewUtils.Create...()** overloads with new arguments **viewTemplateId** & **isAssigned**



Efficiency | Tangency Locks



Efficiency | Tangency Lock API

- **CurveElement**

- **GetAdjoinedCurveElements()** provides info about elements joined to this curve element
- New methods to access and modify tangent constraints
 - **HasTangentJoin()** – is the current join tangent
 - **Get/SetTangentLock()** – enforce tangency at curve join



Efficiency | UI API

- Launch **ColorSelectionDialog**, **FileOpenDialog**, & **FileSaveDialog** from the API
- **TaskDialog**
 - **ExtraCheckBoxText / WasExtraCheckBoxChecked()** provide access to an extra checkbox shown in a TaskDialog
- Dockable Panes
 - **DockablePaneProviderData.VisibleByDefault** controls the default visibility of dockable panes. Default is true.



Efficiency | Journaling Support

- JournalData in overridden commands
 - **BeforeExecutingEventArgs.UsingCommandData**
 - **ExecutedEventArgs.Get/SetJournalData()**
 - Store journal data associated to an overridden command similar to External Commands





Q&A



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