

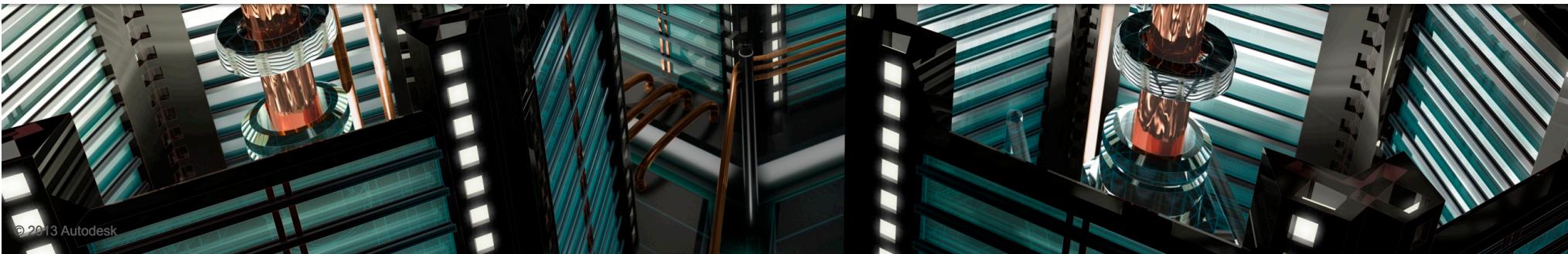


DevCamp 2013

The Revit 2014 API

Jeremy Tammik

Autodesk Developer Consultant



About the Presenter

Jeremy Tammik

Principal Developer Consultant
Developer Technical Services
EMEA, Autodesk SARL



Jeremy is a member of the AEC workgroup of the Autodesk Developer Network ADN team, providing developer support, training, conference presentations, and blogging on the Revit API.

He joined Autodesk in 1988 as the technology evangelist responsible for European developer support to lecture, consult, and support AutoCAD application developers in Europe, the U.S., Australia, and Africa. He was a co-founder of ADGE, the AutoCAD Developer Group Europe, and a prolific author on AutoCAD application development. He left Autodesk in 1994 to work as an HVAC application developer, and then rejoined the company in 2005.

Jeremy graduated in mathematics and physics in Germany, worked as a teacher and translator, then as a C ++ programmer on early GUI and multitasking projects. He is fluent in six European languages, vegetarian, has four kids, plays the flute, likes reading, travelling, theatre improvisation, yoga, carpentry, loves mountains, oceans, sports, dancing, and especially climbing.

Agenda

- Revit 2014 API news
- New SDK samples
- Additional highlights

Revit 2014 API News

Revit 2014 API News

- Copy and paste API – within or between documents, incl. view specific elements
- Project browser API – commands, macros, selected elements
- Schedule API – formatting, read-write data items
- Command API – launch macro, add-in and built-in
- Displaced elements API – exploded views
- Join geometry API – create, remove and control joins
- FreeForm element API – modification of imported solids
- Site API – editing of topography surface points and sub-regions
- Add-in API – loading and execution
- Macro API – list, create, delete and execute
- MEP calculations in external services
- Structural Analysis SDK
- Direct API access to rendering pipeline

More on Revit 2014 API News

- First introduction
 - Revit 2014 API highlights
 - DevDays presentation, recording and sample code

<http://thebuildingcoder.typepad.com/blog/2013/03/revit-2014-api-and-room-plan-view-boundary-polygon-loops.html#2>

- What's New
 - Detailed overview of all enhancements

<http://thebuildingcoder.typepad.com/blog/2013/04/whats-new-in-the-revit-2014-api.html>

Structural Analysis Software Development Toolkit

- Code checking framework
 - Facilitate cc workflows
 - For both users and developers
 - Complete extensible add-in
 - User interface, report generator, data storage
 - Documentation, samples, Visual Studio templates
- Results builder framework
 - Store and access results data in Revit
 - High-level API for consumption, exchange, remote providers

<http://thebuildingcoder.typepad.com/blog/2013/06/structural-analytical-code-checking-and-results-builder.html>

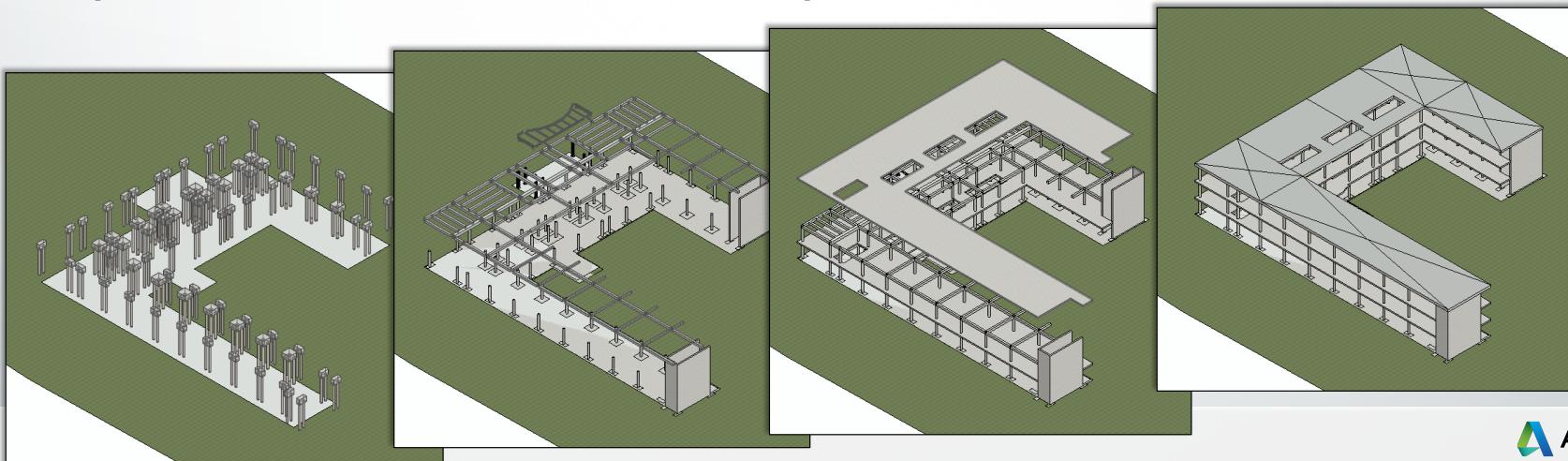
New SDK Samples

New SDK Samples

- DisplacementElementAnimation
- DockableDialogs
- DuplicateViews
- ExtensibleStorageUtility
- FreeFormElement
- PostCommandWorkflow
- ScheduleAutomaticFormatter
- ScheduleToHTML
- SinePlotter
- Site
- Units
- WinderStairs

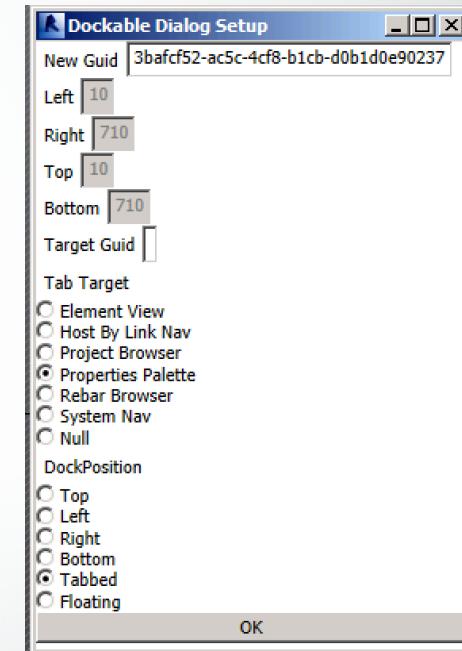
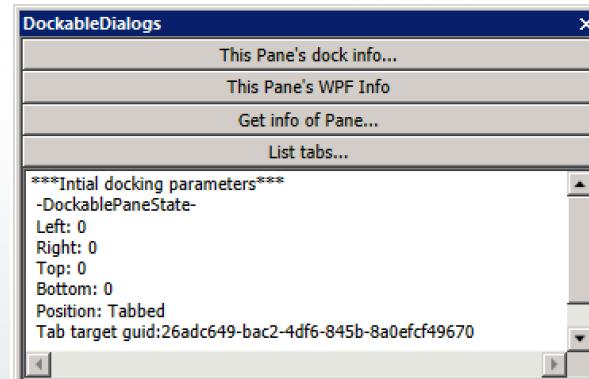
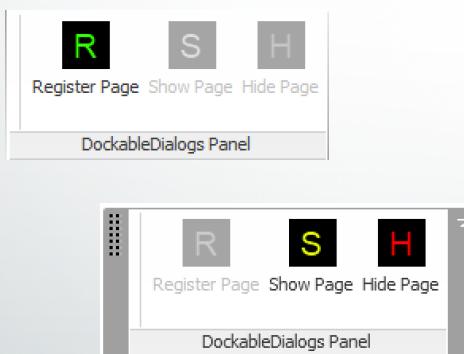
DisplacementElementAnimation

- Programmatically drive element displacement
- Animated exploded view using Idling event
- Sort members into groups based on category and level
- Displace from actual position at command begin
- Animate group by group back to original position
- DisplacementElement and DisplacementPath



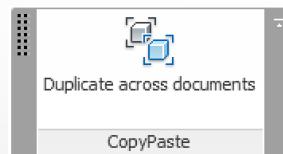
DockableDialogs

- Dockable panel UI API framework
- External app driving external events
- Modeless dialogue design



Duplicate Views

- Use copy and paste API
- Copy drafting views and schedules to new document
- Drafting view contents are also copied

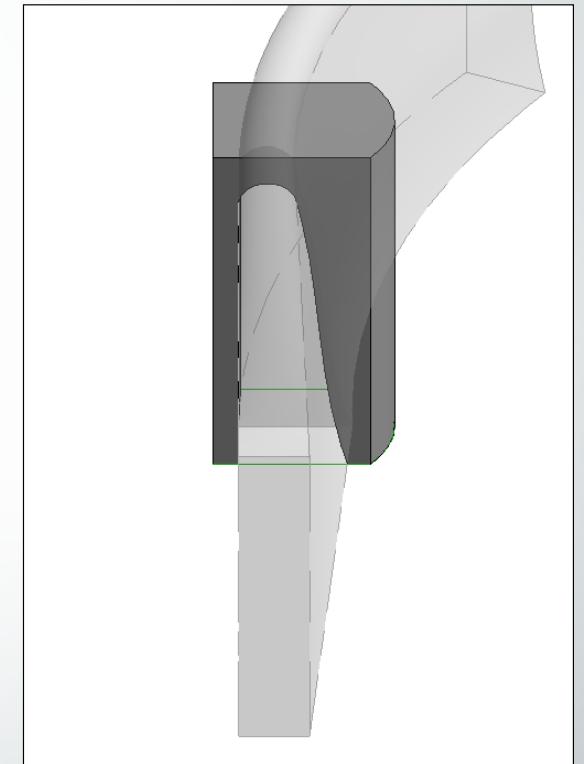


ExtensibleStorageUtility

- Element.GetEntitySchemaGuids
 - Return schema GUIDs of entities present on element
- ExtensibleStorageFilter
 - Quick filter retrieving all elements with a given schema GUID
- Schema GetField and ListFields
 - Honour access restricted by schema read permission setting
- ExtensibleStorageUtility SDK sample
 - Query whether storage for given schema exists in doc
 - Retrieve elements
 - Delete

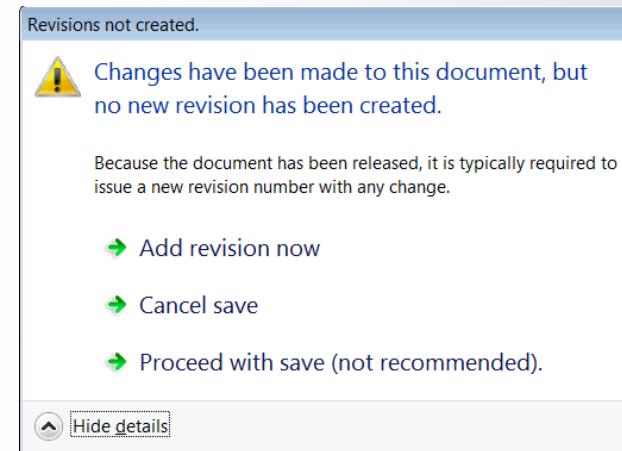
FreeFormElement

- FreeFormElement enables parametrisation of non-parametric imported geometry
- Create a new family representing a negative of a selected non-parametric element
- Select target solid element template and closed loop of curves
- Create a generic model family
- Create a FreeFormElement extrusion
- Subtract target solid from extrusion
- Load family into project
- Place an instance aligned with curves



PostCommandWorkflow

- Demonstrate custom workflow after command execution
- Handle DocumentSaving event
- Modify save behaviour based on number of revision elements
- Implement complex workflows with custom events
- Custom event type implements IExternalEventHandler



ScheduleAutomaticFormatter

- Colour format alternating columns of a schedule table
- Format columns of active schedule in alternating colors
- Store formatting data in extensible storage
- Use dynamic updater to auto-reformat columns
- TableCellStyle and TableCellStyleOverrideOptions

Door Schedule						
A	B	C	D	E	F	G
Door #	Size		Hardware Group	Frame		Comments
	Width	Height		Type	Material	
101A	6' - 8"	7' - 0"	3	1	Alum.	
101B	6' - 8"	7' - 0"	3	1	Alum.	
101C	6' - 8"	7' - 0"	3	1	Alum.	
101D	6' - 8"	7' - 0"	3	1	Alum.	
102	5' - 8"	7' - 0"	1	3	Wood	
103	3' - 0"	7' - 0"	(none)	3	Wood	
104A	3' - 0"	7' - 0"	(none)	3	Wood	
104B	3' - 0"	7' - 0"	(none)	3	Wood	
105A	3' - 0"	7' - 0"	(none)	3	Wood	
105B	3' - 0"	7' - 0"	(none)	3	Wood	
106A	3' - 0"	7' - 0"	(none)	3	Wood	
106B	3' - 0"	7' - 0"	(none)	3	Wood	

Door Schedule						
A	B	C	D	E	F	G
Door #	Size		Hardware Group	Frame		Comments
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101C	6' - 8"	7' - 0"	3	1	Alum.	
101D	6' - 8"	7' - 0"	3	1	Alum.	
102	5' - 8"	7' - 0"	1	3	Wood	
103	3' - 0"	7' - 0"	(none)	3	Wood	
104A	3' - 0"	7' - 0"	(none)	3	Wood	
104B	3' - 0"	7' - 0"	(none)	3	Wood	
105A	3' - 0"	7' - 0"	(none)	3	Wood	
105B	3' - 0"	7' - 0"	(none)	3	Wood	
106A	3' - 0"	7' - 0"	(none)	3	Wood	
106B	3' - 0"	7' - 0"	(none)	3	Wood	

ScheduleToHTML

- Export and display schedule in formatted HTML
- Handle header, body, background color, bold, italic, underline, horizontal alignment, merged cells
- Exercise ViewSchedule, TableData, TableSectionData, TableCellStyle and TableMergedCell classes

Door Schedule						
Door #	Size		Hardware Group	Frame		Comments
	Width	Height		Type	Material	
101A	6' - 8"	7' - 0"	3	1	Alum.	
101B	6' - 8"	7' - 0"	3	1	Alum.	
101C	6' - 8"	7' - 0"	3	1	Alum.	
101D	6' - 8"	7' - 0"	3	1	Alum.	
102	5' - 8"	7' - 0"	1	3	Wood	
103	3' - 0"	7' - 0"	(none)	3	Wood	
104A	3' - 0"	7' - 0"	(none)	3	Wood	
104B	3' - 0"	7' - 0"	(none)	3	Wood	
105A	3' - 0"	7' - 0"	(none)	3	Wood	
105B	3' - 0"	7' - 0"	(none)	3	Wood	
106A	3' - 0"	7' - 0"	(none)	3	Wood	
106B	3' - 0"	7' - 0"	(none)	3	Wood	
108A	3' - 0"	7' - 0"	(none)	3	Wood	
108B	3' - 0"	7' - 0"	(none)	3	Wood	
109	3' - 0"	7' - 0"	(none)	3	Wood	
110	3' - 0"	7' - 0"	(none)	3	Wood	
112	3' - 0"	7' - 0"	(none)	3	Wood	
113	3' - 0"	7' - 0"	(none)	3	Wood	
114	3' - 0"	7' - 0"	(none)	1	Alum.	
115	6' - 0"	7' - 0"	(none)	3	Wood	
116	3' - 0"	7' - 0"	(none)	3	Wood	
117	3' - 0"	7' - 0"	(none)	3	Wood	
119A	3' - 0"	7' - 0"	(none)	2	HM	
120	6' - 0"	7' - 0"	(none)	1	Alum.	
121A	6' - 0"	7' - 0"	(none)	1	Alum.	

SinePlotter

- Sine curve representation
- Array of prism family instances
- Prism family types
 - Cylinder
 - Rectangular
 - Regular Polygon
 - Isotriangle
- Modifiable settings
 1. Curve Period: 0.1 to 3.0
 2. Curve Cycles: > 0.0
 3. Curve Amplitude: -4.0 to 4.0
 4. Number of partitions: > 0.0

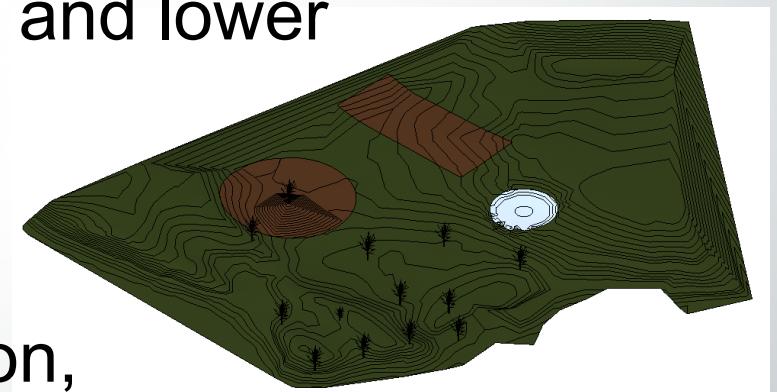


The screenshot shows a user interface for the SinePlotter application. It includes input fields for 'curve period' (0.2), 'curve cycles' (10), 'curve amplitude' (3), 'number of partitions' (3), and a dropdown menu set to 'cylinder prism'. A green 'run' button is visible on the right. Below the interface, the text 'ArrayPrismsOnASineCurve' is displayed.

Note: Hit “Enter” key for the text box edits to be accepted

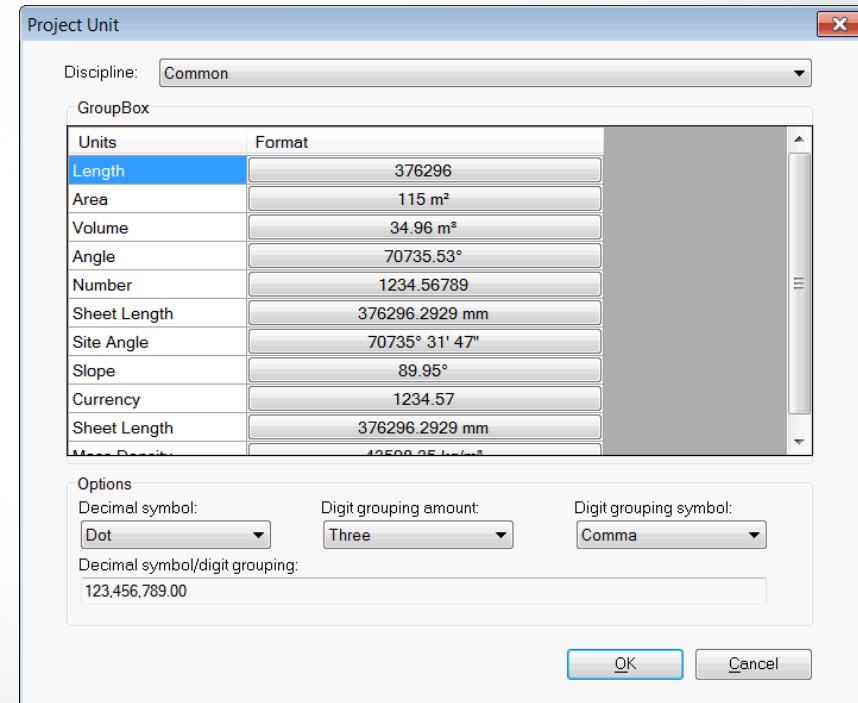
Site

- Edit topography surface and site sub-region
- Create a circular retaining pond topography family at user specified location
- Move sub-region and points, raise and lower subregion terrain
- Normalize sub-region terrain
- Delete sub-region and its points
- TopographySurface, SiteSubRegion, TopographyEditScope classes



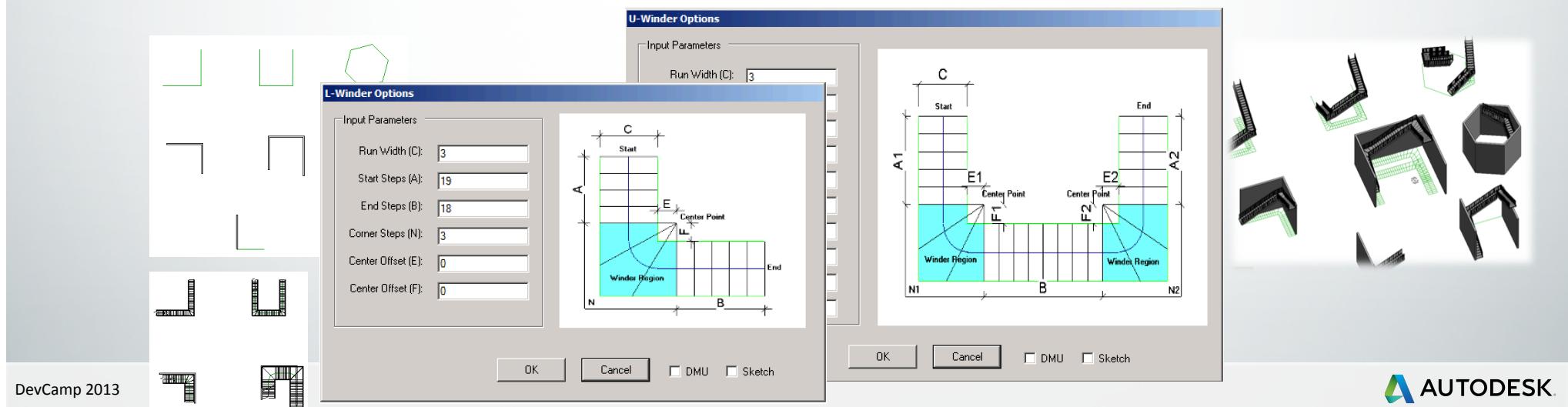
Units

- Demonstrate Units API
- List units in current project
- Display format information
- Modify format options for each unit type



WinderStairs

- Create winder stairs via sketched stairs API
- Support L-Winder and U-Winder layout algorithms
- Use DMU (dynamic model update) for regeneration
- Select model lines or walls, specify run numbers, width



Additional Highlights

CustomExporter – Access Graphics Rendering Pipeline

- Implement IExportContext interface
- Instantiate CustomExporter from doc and context
- Call Export method

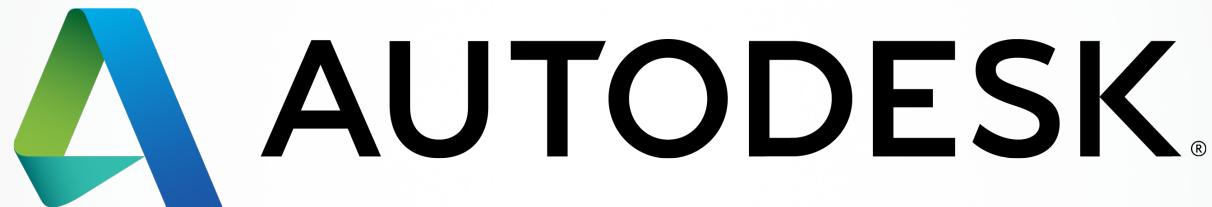
CustomExporterXml

- Export all accessible rendering pipeline data to XML

CustomExporterCollada

- Export model geometry to Collada – www.collada.org

The End is just the Beginning...



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