Autodesk University 2012

Animations for Architects

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AB3759

Learning Objectives

At the end of this class, you will be able to:

- Demonstrate the benefits of animations as a design tool
- Make design decisions through quick animations
- Explain concepts and information to clients and managers through animation
- Implement real project examples in your firm

About the Speaker

Eric Mitchell servers a dual role as an architectural designer and digital design lead at KlingStubbins in Raleigh, North Carolina. Eric is committed to design aesthetics and seeks ways to improve design, affordability and efficiency through the use of digital tools and technologies. His research has helped expand the impact of BIM and digital design and has generated improvements in standards and workflows. Eric has guest lectured at North Carolina State University, College of Design and Autodesk University on digital design practices.

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Introduction

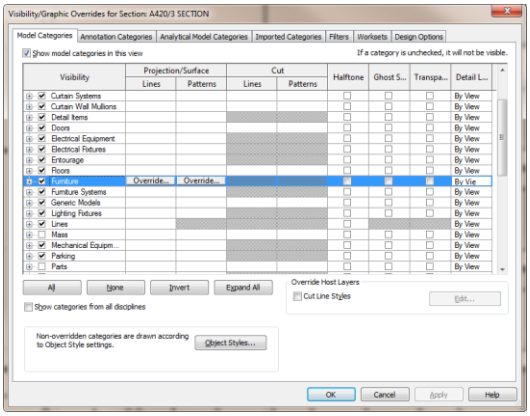
What are quick animations?

Typically people see animations as a time intensive, highly polished and expensive presentation tool. Too often animations are used at the end of a project to display the final design. Quick animation turns these ideas upside down. While a traditional animation might take weeks or even months to complete a quick animation has an ideal turn around or 1-2 days sometimes even less! More importantly quick animations help to develop and further the design not just present.

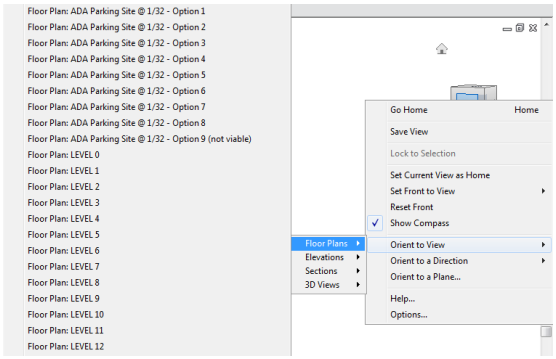
Standard Setup

Regardless of the end result much of the initial setup is similar. While there are a variety of geometry creation programs this tutorial will give preference to a Revit to 3ds Max workflow. Revit provides a number of benefits including simultaneous project documentation and geometry creation, easy option sets and simple LOD control for geometry push to rendering. The steps below are the basis of all the case studies to follow.

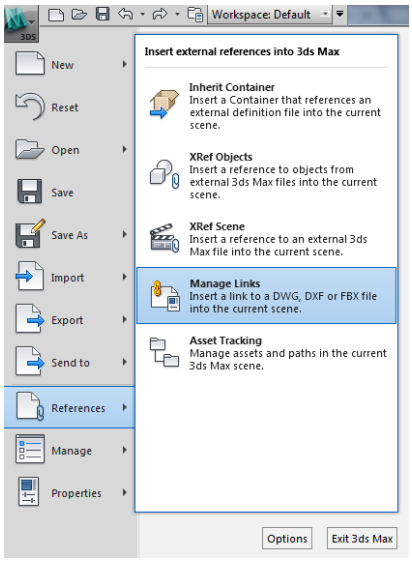
1. Create geometry: Geometry can be created in a variety of programs (Revit, AutoCad, 3DStudio Max, etc.). As you model, consider the level of detail (LOD) required. The more geometry, the larger the files and the longer the render time. If you are utilizing Revit you can run your project file and your 3ds max file in parallel and use filtering to manage LOD.
    a. *TIP*: Setup export views in Revit that maintain your LOD needs. As your project develops designated export views will allow you to quickly push geometry out for rendering and animations.

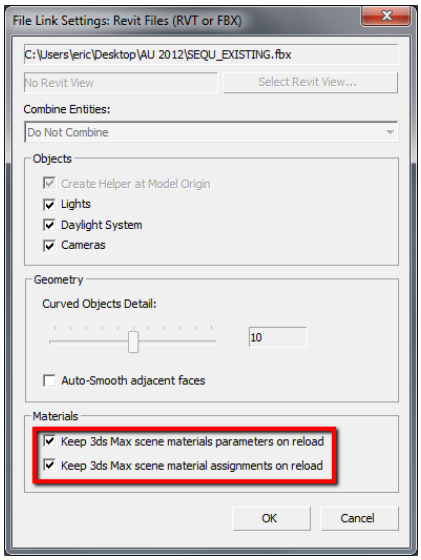


2. Apply Materials: It is much faster to apply materials as you model in comparison to applying materials after everything has already been modeled. In addition, the accuracy is typically increased since you won't have to hunt for everything that needs to be a certain material.
3. Export Geometry: geometry can be exported in a number of different formats. The most common exports from Revit to 3ds max are dwg and fbx. Additionally, the 2013 design suite allows direct import of Revit into 3ds max. Each file format has its benefits and drawbacks. A number of AU classes have focused on the geometry export/import between Revit and 3ds max and can provide in-depth review.
    a. *TIP*: When using Revit utilize the view cube to quickly orient 3d views to specific plans or sections for animated floor plans or sections.



4. Import/Link Geometry: Once geometry has been exported it will need to be brought into 3ds max. It is important files be linked and NOT imported. Quick animations should be used to help aid the design process and therefore will be constantly changing and being updated. If you have been diligent with material application while building your geometry then you can import "via material from Revit". If you have been lax you might want to import via individual elements so that you can apply materials more precisely to individual geometry objects. When geometry is linked insure that the "keep materials on reload" option is checked.



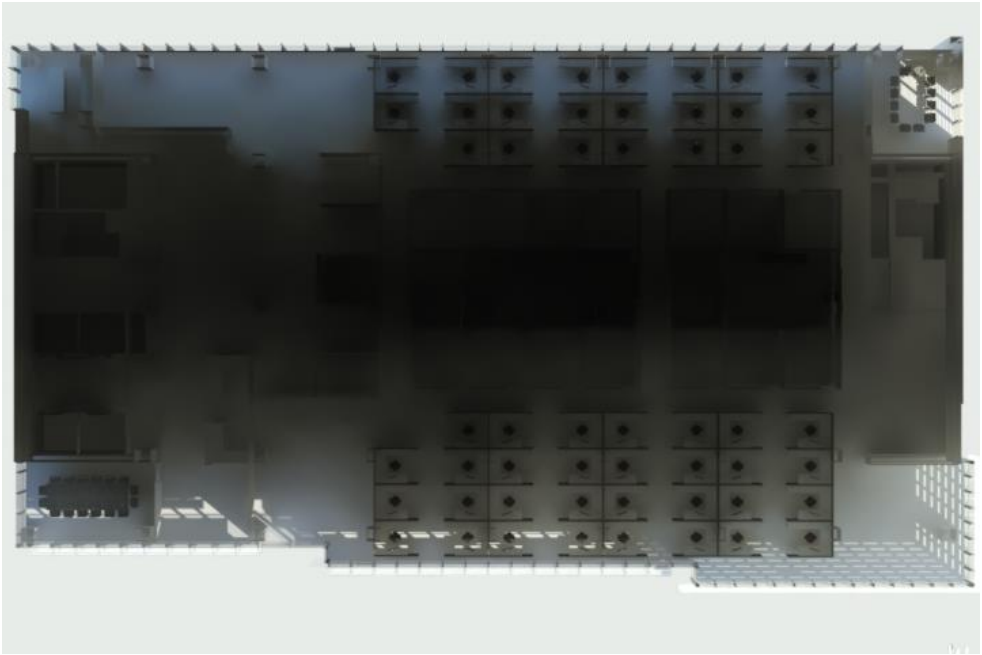


Case Studies

The examples below are real examples of quick animations. Each case will provide a description of the project and design challenge, approximate time required to produce a product, detail the workflow used and show an example of the final product.

Sustainability: Glare Control and Shading Options

- Project: Public Safety Center
- Design Challenge: How do various exterior and interior shading options affect glare in an office building?
- Approximate Production Time: Four(4) days



Workflow

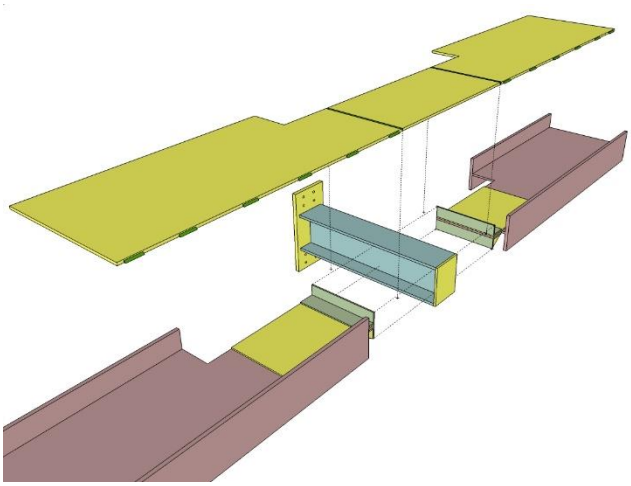
1. Develop your floor plan and insert desired furniture. It may be useful to model additional elements not needed for documentation such as computer screens to help demonstrate the results to your audience. "Non-essential" elements should be placed on a separate "default off" workest to avoid polluting the documentation drawings.
2. Create a new workset such as "concepts" or "sunshades" and model your design options in Revit using the design options tool set, placing the options on the new workset. Create a primary option without any geometry named "blank" or "empty". Generate any options you want to test such as varied spacing, shading depth and materiality.
3. In Revit setup a 3d view and utilize the view cube to orient the view to your desired floor plan. By default the section box will be based on the floor plan view range (typically 4' cut plane). Adjust the section box to include an entire level of the building.
4. Use visibility graphics and selection sets to remove unnecessary elements such as model lines, excess furniture, etc. While in visibility graphics set the design option to "blank".
5. Export the view to your desired format and name the file "base".
6. Within the same 3d view in Revit modify the visibility graphics to show the first design option. Hide all other worksets so that only the design option is showing. Export the file naming it "option a" or similar.
7. Repeat the above step until all options are exported.
8. In 3ds max start a new project and select manage links. Link the "base" file into your 3ds max project using the instruction at the start of this tutorial.
9. Apply and/or sub-out materials as desired. The materials need to be accurate in regards to diffuse and reflectance properties. A number of presentations can be found on 3DS max and solar analysis; for the most accurate results referencing these materials is suggested.
    a. *TIP*: this study does not require materials to be realistic in appearance but rather in reflectance and diffusion. The intent is shadow and glare location not material appearance. For the fastest results utilize the material override option and a generic "clay" material, time can be saved on material application.
10. Link the "option a" file into your 3ds max project. By default 3ds max will assign all elements onto a new layer. Apply desired materials to the new link. Repeat this step for all other options.

Constructability: Curtain Wall Detail

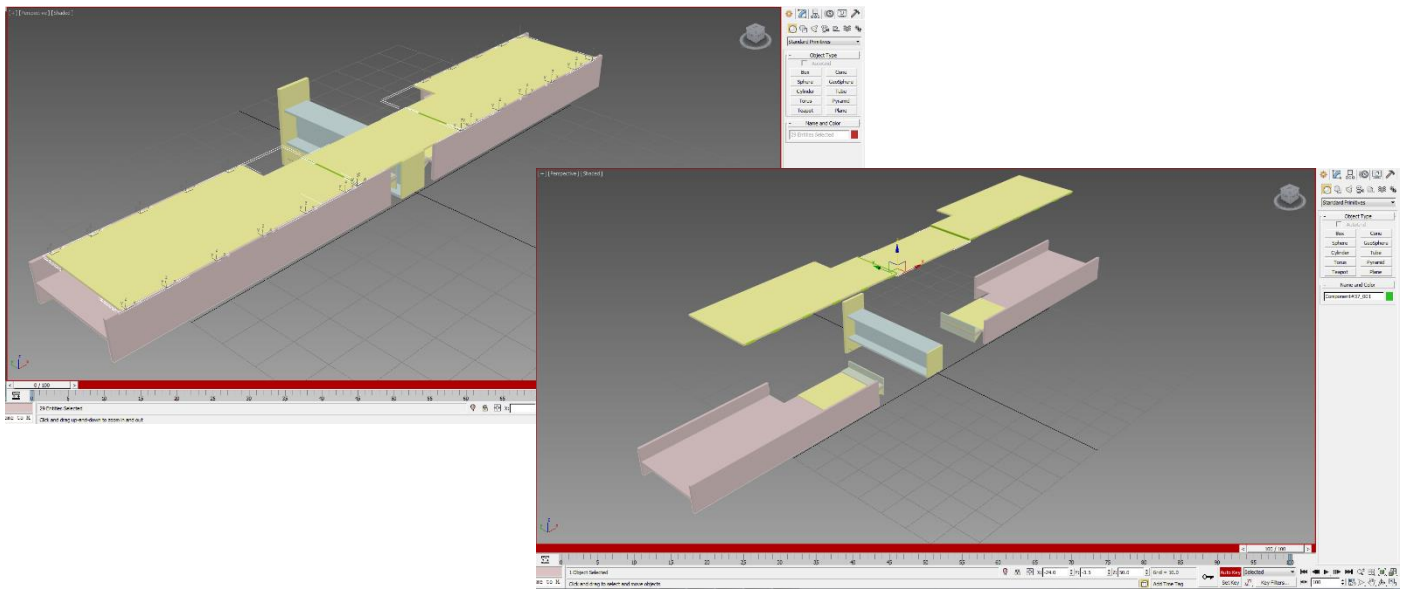
- Project: Office High-rise
- Design Challenge: How to best detail a complex curtain wall assembly and insure smoke penetration is limited?
- Approximate Production Time: Two(2) days

Workflow

1. Generate geometry within Revit. Ideally you should have all the geometry needed from your documentation development, however, some smaller items such as misc steel or may need to be built using the “model in place” tool and generic masses.
    a. *TIP*: As always remember to place non-documentation items on a separate workset to keep your documentation file clean

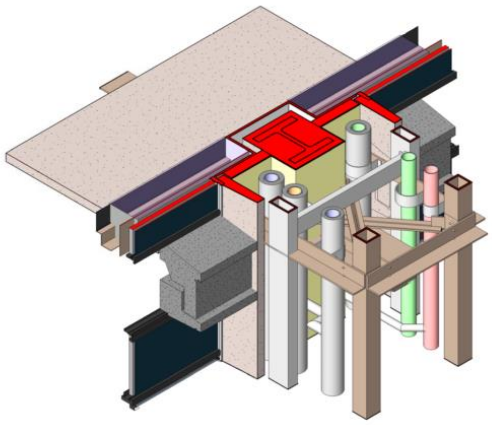


2. Create an export view using the section box to size the model down to the essentials. Export geometry.
3. Start a new 3ds max file and import geometry
4. Apply materials to your geometry or use the pick tool to reassign materials as desired.
5. Create a camera, daylight system and modify the render settings.
6. Setup your animation timeline. Start with geometry in its “completed state”. Start the autokey and slide the timeline forward to approximately frame 100 (assuming a 100 frame timeline, adjust as needed to suit render time and frame rate). At frame 100 move the geometry up and out allowing enough room to see all the components and allow for labeling in pos production. Move and adjust geometry until you achieve the desired “exploded axon look”. End the autokey, rewind and check the playback.



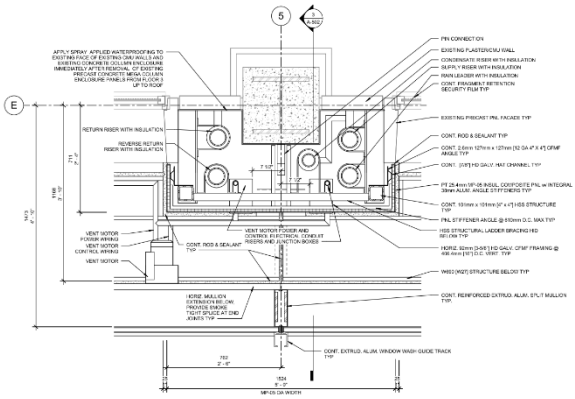
Sequencing: Construction Sequencing

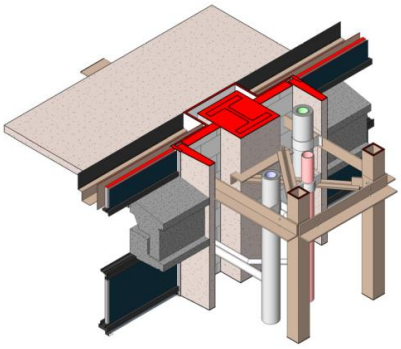
- Project: Office High-rise
- Design Challenge: Choreograph the construction sequence required to add and remove systems in a complex vertical chase
- Approximate Production Time: Four(4) days

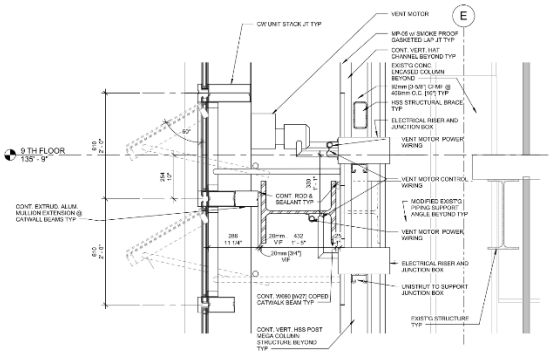


Workflow

1. Generate geometry within Revit. Ideally you should have all the geometry needed from your documentation development, however, some smaller items such as misc steel or smaller piping may need to be built using the “model in place” tool and generic masses.
    a. *TIP*: As always remember to place non-documentation items on a separate workset to keep your documentation file clean





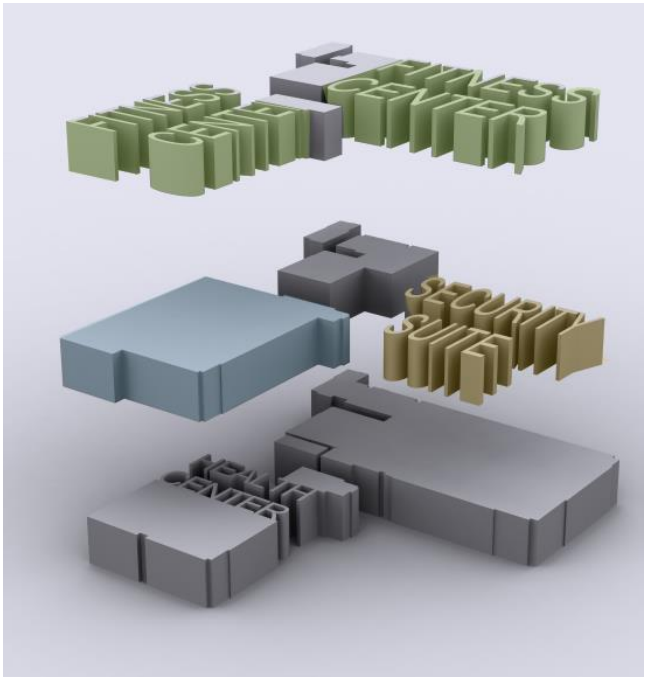


2. Create an export view using the section box to size the model down to the essentials. Export geometry.
3. Start a new 3ds max file and import geometry.

4. Separate your geometry using layers. Setup and number as many layers are there will be phases in the sequence.
5. Apply materials to your geometry or use the pick tool to reassign materials as desired. The basic ceramic or plastic material with modified diffuse color works well in this application, however materials can be anything desired.
6. Create a camera, daylight system and modify the render settings.
7. Setup an animation timeline if you have a large number of phases or render frames individually for smaller sequences. Start with the "existing" layer and render the frame. Enable/display the layer containing phase 1 and render the frame. Continue this process until you have a frame for each phase.
8. Create a new project in Premier or similar video editing program. Insert the stills setting them to be 3-5 seconds long. Use a fade transition between each still. Generate a legend or text to describe the sequencing as it occurs. Process the video.

Understanding: Programmatic Diagraming

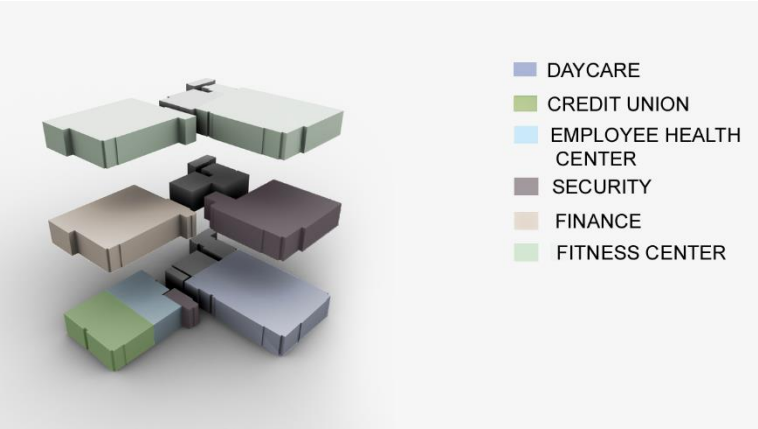
- Project: Campus Master Plan
- Design Challenge: Explain programmatic shifts in plan throughout various campus buildings
- Approximate Production Time: One-Four(1-4) days



Workflow

1. Generate masses within Revit using the "model in place" tool and generic masses. Masses can be simple extrusions using floor plans or area plans to generate the footprint information. Start by creating a mass for the entire building footprint and then begin generating the individual spaces as needed.
    b. *TIP*: Remember to place masses on a separate workset to keep your documentation file clean
2. Create an export view with only the masses visible and export geometry.
3. Start a new 3ds max file and import geometry.
4. Apply materials to your spaces as desired. The basic ceramic or plastic material with modified diffuse color works well in this application, however materials can be anything desired.

5. Setup your animation timeline. Start with your masses stacked and the exterior skin covering the interior masses. Start the autokey and slide the timeline forward to approximately frame 30 (assuming a 100 frame timeline, adjust as needed to suit render time and frame rate). At frame 30 use the melt modifier to melt the exterior skin into a flat plane. Progress the timeline forward to frame 100. Select your top floor of masses and move them up and out allowing enough room to move additional floors similarly. Move and adjust floor until you achieve the desired "exploded axon look". End the autokey, rewind and check the playback. Your exterior should melt down, expose the interior spaces which then explode to display all floors.
6. Create a camera, daylight system and modify the render settings. Double check that your scene fits in the render area at frame 100 when the explode axon is at its largest point. Use the override material option and set the material to a white/grey clay or plastic material. Start your rendering and come back in the morning.
7. Confirm that your animation properly rendered. Set your render seting to render the last frame (100) and then render a still and save to png. Repeat this process but remove the material override. Render this last frame which should show the melted exterior and exploded interior spaces with color. Save the still as a png.
    c. TIP: Don't spend too much time tweaking the colors of your spaces. Make sure that the colors are distinct as you will use the colors to quick select in Photoshop.
8. Bring the two stills into Photoshop. Using the wand tool, quick select a color, fill the selection area with your desired color and create a separate layer for the selection. Repeat this process till all colors have been selected.
9. Select all newly created layers and drag them onto the all-white clay still. Set the color layers to overlay. The colors should superimpose onto the clay model. This will allow you to quickly change the colors to suit without having to re-render.



10. Create a legend adding the color and text for each space. Turn on one layer at a time so that the colored space and corresponding legend show. Save the still and add another layer building until all spaces and legend components are shown and saved.
11. Create a new project in Premier or similar video editing program. Start with your animation from 3ds Max. Add the still clay image at the end of the animation sequence and place your separate color stills following. At each color still allow the frame to hold

for approximately 3-5 seconds to allow viewers to see the color and corresponding legend info. At each color frame use the fade feature to transition the next color in. This will give the appearance of animated color change without the render times.

12. Apply an additional titles, text and music as needed. Additional animations such as overall campus aerials and fly-arounds can be combined with the explode axon diagrams to create impressive presentations. Once compiled render your video and process into your desired file format.