AS323037

Cinematography in Architectural Visualization

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Learning Objectives

- Learn how to create a storyboard using cinematography techniques to define the story of your design
- Learn how to utilize the types of shots used in architectural visualization to tell your story
- Learn how to create quality presentations using proper framing, lighting, and motion
- Learn how to save production time through proper use of cinematography and editing

Description

Cinematography is the art of telling a story through motion pictures. Understanding the concepts of cinematography is essential to telling the story of your design. Learning and understanding the types of shots used, proper use of lighting and motion, image framing, and editing techniques can help you produce better-quality presentations. Using proper cinematography techniques, you can focus the viewers' attention on the aspects of the design that you want them to learn. In addition, by focusing on specific aspects of the design, you can reduce the time required to create the presentation. Come and learn how to build better presentations in a shorter time.

Speaker(s)

Stephen heads up the rendering and animation services at MG.aec using 3ds Max, Revit and Unreal Studio. He has been rendering architectural and manufacturing jobs full time at MG.aec since 2007 and have been working with 3ds Max since 2001. In addition to rendering and animation, Stephen teaches 3ds Max using standardized and customized curriculum and has taught at a variety of local and national level events including Autodesk University. Stephen holds a Bachelor of Science in Architectural Studies from the University of Wisconsin/Milwaukee and is an Autodesk Certified Instructor Gold Badge. He is also an Autodesk certified professional for Revit and 3ds Max.

The Walkthrough

The use of computer generated images within the architectural field has changed the way we present designs to our clients. The walkthrough, or flythrough, animation is commonly requested by architects to highlight their project from the perspective of the designer moving through the space. The resulting animation is frequently long and not very captivating —the pace is often too fast or too slow, and a great deal of time is spent looking at a point along the camera path rather than points of interest within the design.

As a result, the viewer becomes bored and disinterested. The question then arises: How do we communicate our design effectively while drawing interest and maintaining attention? The architectural film is one method to achieve these goals while drawing on knowledge from the motion picture industry to help better present designs.

In addition to resulting in a more appealing output, the architectural film can reduce the time and cost of creating the animation as we eliminate the need to model areas we will not see, eliminate lights that take time to render but don't affect the output and reduce the length of each shot which reduces both manpower in preparing the animation as well as greatly reducing rendering times.

What, Why and Who

Three questions can help us define our intentions before we even begin. What are we doing is the first and that is evident. We are preparing a presentation to help communicate our design intent. Why are we doing this is also evident as our clients have not been trained to read and interpret drawings. A picture speaks a thousand words and an animation speaks a thousand pictures by allowing the viewer to perceive the space rather than just a 2D representation of it.

The who are we doing this for is the single largest stumbling block in the initial process. The walkthrough animation speaks to the desires of the designer as they can show the client everything. The difficulty here is that the designer knows what they designed, they know what to look at and when and how it all ties together. The client does not. As a result they don't see everything the designer wants them to see because it has not been placed directly in front of them or because their interest has wondered due to the pacing.

The architectural film seeks to overcome this limitation by using cinematography techniques to guide how we put together our animations and communicate our designs in a more concise and understandable format.

Cinematography

Cinematography is the art of visual story telling. We see it every day on television, in the movies, on our computers and cell phones. Cinematography has been around for over a hundred years while the walkthrough has been around in a meaningful form for less than 30.

With its long history, cinematography has developed techniques and standards, which can be used to refine our story telling process. These standards include defining the types of shots, use of lighting and framing and camera motion and speed.

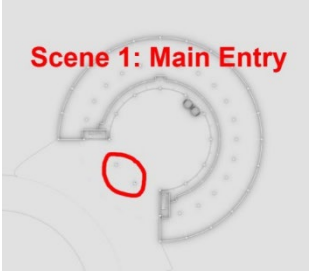
These tools will be discussed to help define the storyboard, a document that defines each shot and transition in the animation.

The Storyboard

Creating the storyboard for an animation is arguably the most important step in the animation process. The storyboard defines every shot that will be used to tell the story. Defining this early in the process saves time and in the long run money. And when properly executed, it will result in a far better animation that conveys the design more completely to the client.

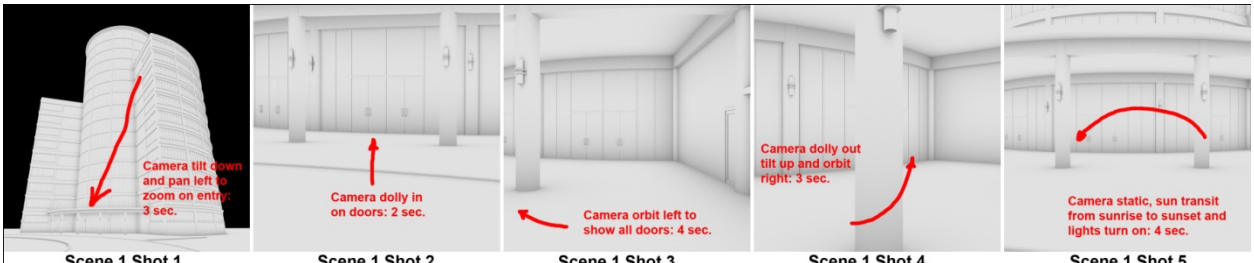
The storyboard breaks the animation down into scenes composed of shot and includes information about what are we looking at, where is the camera at, what is the lighting, how long will the shot be and any camera movement or effects involved.

Traditionally, the storyboard is a series of drawn images with additional information tagged to them detailing the key information of the shot. In architectural visualization the process is much simpler as our actor is the design, not a human being or animal. Frequently, a marked up plan is enough to detail out the storyboard. Regardless of the form, the storyboard should detail the most significant aspects of the design and in the order that they are to be presented. The remainder of this course covers the techniques and terminology that will help you create a more effective storyboard that will result in better animations in a shorter amount of time.



Scenes and Shots

The storyboard consists of a series of scenes broken down into shots that, when edited together, will comprise the film. Each scene in the storyboard defines a key area of interest, such as a building exterior, main entry, lobby, conference room, or premier office. The scenes selected should have both high impact in appearance and high importance within the design. Each scene should focus on a major subject within the design, and the details within that area are defined using various shots.



Sample Storyboard

Shots are the individual camera positions and movements that focus on specific aspects in the scene. The first thing a shot needs to establish is its frame. The frame determines what is being

shown in the shot, where the focus of the shot lies, and what type of motion the camera will have.

Each individual shot will also have a length, the time/duration that the shot will run. The human attention span begins to drift at about 6 seconds if there is no significant change in the subject, so shots should be kept at 6 seconds or less to keep from losing the audience's attention.

Shots

In the architectural film, there are generally four types of shots that will help determine the frame, focus and motion of the camera:

1. Establishing shot
2. Transition shot
3. Perception shot
4. Detail shot

The use of these four basic shots can help to quickly define the location of the scene and to explore not only the space, but also highlight specific features that are important to the design while keeping the audience's interest.

Establishing Shot

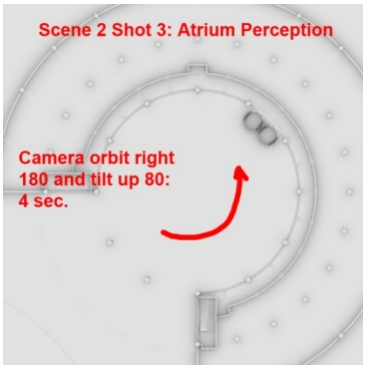
The *Establishing* shot is used to inform the viewer where the next shot is going to be located with respect to the current scene or shot. This could be represented as panning toward a door while zooming in on it. The human mind understands this connectivity by repeated exposure to motion picture films—it is something we have been trained to understand from a very young age. In the case of the architectural film, it is not necessary to show the entire 30 second approach to the front of a building; rather, an establishing shot can be used to draw attention to the front and main entrance while another shot can show the detail of the entrance or the transition into the building.

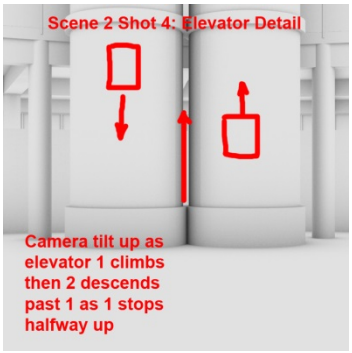
Transition Shot

The second commonly used shot is the *Transition* shot. The transition is used to define the boundary between two separate spaces within the building, as these are frequently critical to the design. A transition shot may show the movement from exterior to interior, from an open atrium into a corridor, or from a corridor into an auditorium. This allows the viewer to experience moving from one space to another without having to watch 15 seconds of walking down the corridor and looking at the door to the men's rest room before turning the corner and entering a conference room.

Perception Shot

Once within a space, the *Perception* shot is used. This shot is frequently executed with a great deal of camera motion to allow the camera to perceive a majority of the space, vertically as well as horizontally. By moving the camera within the space, a more compelling image can be offered while also communicating the three-dimensional nature of the space.





Detail Shot

The *Detail* shot is used to draw attention to specific details within a space. This shot is similar to a close up of an actor in a standard motion picture, but it focuses instead on specific design features. These features could be specific doors, a reception area, detail elements on the walls or ceilings, light fixtures, sculpture, or even a view out the window of the city or landscape surrounding the building. The detail shot specifically focuses the attention of the viewer on an essential element of the design without needing to verbally tell them to look at it.

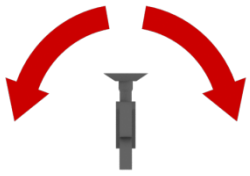
The Camera

While storyboarding each shot, you will need to define the type of shot as well as the movement of the camera and effects such as depth of field, exposure and motion blur. Cinematography has defined specific motions of a camera and using these can provide a consistent understanding across the entire team, from designer to animator and editor.

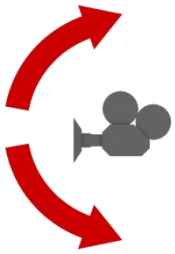
Camera Movement

Understanding these camera moves will help in setting up the shots within scenes in a method that is understandable and comfortable to the audience. The camera should not move just for the sake of movement, however — it should move with a purpose, whether it is focusing attention on a specific detail or establishing a three-dimensional sense of the space.

The camera pan is the most basic movement and involves rotating the camera to the left or right along the horizontal plane. This is used extensively to draw focus to specific details as well as convey the sense of space within the design. It is also used while the camera is moving to predict turning. A driver in a car or a pedestrian walking into a building turns their head as they approach a corner to see where they are heading, and it is important to do this with transition shots to properly communicate the passage and provide more compelling imagery without inducing motion sickness.



Camera Pan



The camera tilt rotates the camera up and down, allowing you to look up to a skylight or down into an atrium from a balcony. The tilt is frequently combined with the pan and other moves to maintain focus and lead the viewer's attention. The tilt may not be typically used in normal spaces, as the ceiling and floor will be within the view, but it is essential when communicating higher spaces, details below the normal view or strong vertical elements such as columns or tall buildings.

Camera Tilt

The dolly or move in/move out physically moves the location of the camera within the scene either towards or away from its target. The dolly move is the traditional walkthrough camera, moving the camera along its axis of view in the scene. The dolly is used in transition shots to move the camera between two spaces and can be used in most other shots as well.

Camera Dolly

The truck is also a movement of the camera, but in the truck, the camera moves perpendicular to the viewing axis of the camera. The truck can be used to move along the side of a building to communicate its appearance as well as how it integrates with its environment.

Camera Truck

The crane move involves elevating the camera and can be used with other camera moves to provide a unique perception of an interior space or exterior façade.

Camera Crane

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The orbit, referred to as a circle track in motion pictures, rotates the camera about a target point, allowing us to show multiple sides of our subject. The orbit is especially useful for shots detailing the outside of a building and, when combined with a crane, allows the perspective to slide up the building to further establish its location.

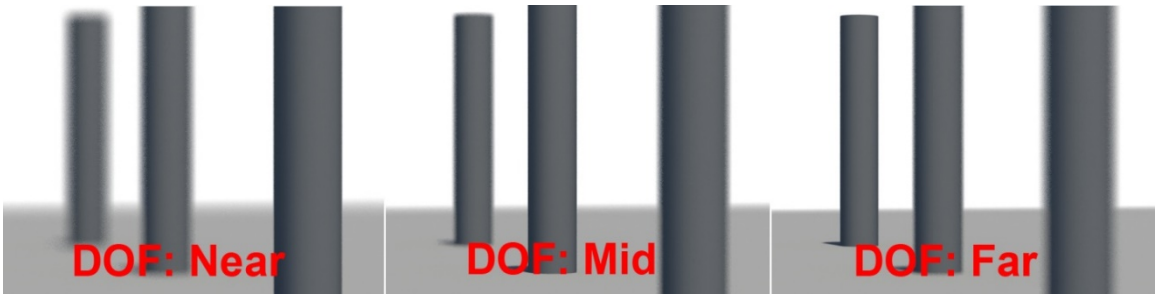
Camera Orbit

The Camera Field

There are two other aspects of the camera that drastically affect the shot: depth of field and field of view. Combined, these two aspects of the camera define how much is shown within the frame of view and where the emphasis is placed within the depth of the frame.

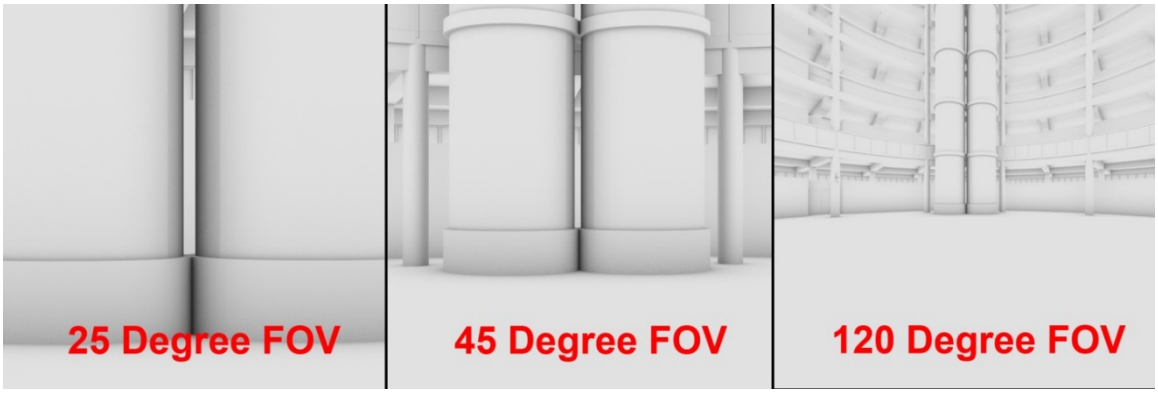
Depth of Field

Depth of field refers to the focal point of the camera, and it determines where objects that are closer to the camera and farther from the camera begin to blur. This is a natural function of all cameras, and even human eyesight —though it is not often noticed in the latter due to eyes automatically refocusing as a person looks around. Depth of field can be used to focus interest precisely on a specific subject by keeping it within focus while everything else is blurred.



Field of View

Field of view determines the angular width of the camera view (a human eye averages about 45 degrees of angular width). By decreasing the field of view, the film can zoom in on an object, and by increasing it can zoom out. While this may seem the same as moving the camera in and out, it is distinctly different as the field of view affects the depth of field. The depth of field decreases as the field of view decreases, which may cause the foreground and background to blur out as the camera zooms in. Another consideration when using a very wide field of view is spherical distortion. This is a bending of parallel lines at the edge of the view caused by the curvature of the lens and results in the fish eye lens view.



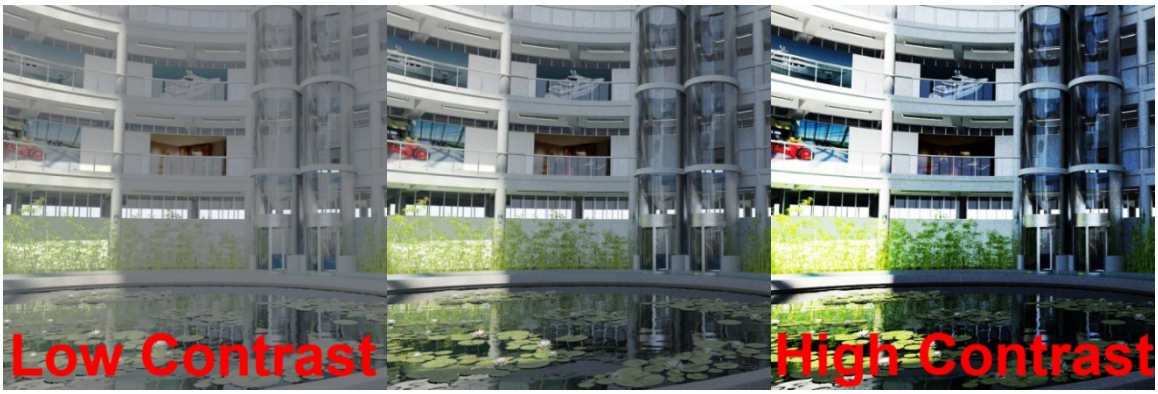
Lighting

Lighting within an architectural film has two major functions. First, it illuminates the scene so that we can see it and second, it adds emotion or feel to the images. Typically, an architectural scene will be lit as practical, but there are two things to be aware of: exposure and white point. By setting proper exposure and white point, the scene can not only be illuminated, but specific details can be emphasized and emotion imparted to the image that will further the communication of the design.

Exposure

Exposure controls the overall brightness and contrast of the image, and this is extremely important to achieving good results. The brightness of an image determines what can and cannot be seen, and it essentially represents how well lit the building is. If the image is not well-lit, details will not be seen. If it is over-exposed, foreground and subject areas may be burned out and the image will appear flat.

The contrast determines the dynamic range from fully-dark to fully-exposed and everything in between. Too little contrast and the image muddies out and appears flat; too much and the result is burned-out highlights, deep shadows and not much in between. Balancing the exposure control will result in images that have the appropriate brightness and contrast, resulting in more compelling and communicative images.



Once the exposure has been set, the next consideration is the *mood of the lighting* which is influenced by several factors including the type of source, the time of day and the overall color temperature. Light fixtures within the building are placed not only to provide illumination, but to accent as well, and the spill of these lights and the way they play on surfaces will directly affect the feel of the image. Daylight adds more complexity due to its nature as both a direct source, from the sun, and an indirect source, from the sky. One must be careful when combining daylight with fixture-based lighting as the daylight is far stronger and can frequently overwhelm the placed lighting. Daylight is also dependent on the time of day and location and can vary quite a bit.

Color Temperature

Color temperature is an important concept in art and photography, and understanding its basis is essential to achieving good lighting.

The human brain sets a white point under any situation where it interprets a specific color as being white despite the actual color of light. This is why a sheet of paper looks white when illuminated by an incandescent bulb, a fluorescent bulb or daylight when, in truth, the incandescent bulb produces an orange light, the fluorescent produces a blue-green light and daylight has more blue. While the human eye adjusts to this automatically, the camera does not —and this needs to be taken into account when setting the exposure. If exposure is done properly, then white will appear white— but there are times when it is useful to shift the color temperature.

Shifting the color temperature of the camera up will make the colors warmer or yellower, while shifting it down will make them cooler or bluer. Slightly yellower lighting results in a more welcoming appearance, especially when using natural stone and wood. Slightly bluer lighting leaves a colder but cleaner appearance.

Common Techniques

The information from the previous sections can be combined and used to create additional interest while in the shot while still reducing the time spent on creating and rendering the shot.

The use of compositing software, such as Autodesk® Smoke or Adobe® After Effects, can further reduce the rendering time by moving some of these functions into the post-processing realm of production. This also allows better control of the final output with the capability of correcting things like exposure and color temperature as well as overall color.

- Establish the storyboard as early as possible in the process and stick to it to eliminate scope creep and reduce the times for model preparation, materials, lighting, animation and rendering.
- For perception shots, try using a series of short shots changing the angle and movement of the camera as well as its start and end points.
- When switching between shots with animated cameras, pad the animations in front of and behind the cut points so that the camera does not start or stop during the shot. This creates a more dynamic effect when switching between cameras, especially for perceptual shots.
- For static detail shots, avoid facing the subject straight on, place the camera at an angle to the surface or object. This gives the framing a more dynamic and realistic feel.
- For detail shots of the façade, render a single frame oversized then use the compositing software to slide it through the field of view to produce the animation rather than running the hundreds of shots needed to achieve the affect in your rendering engine.
- For establishing shots, render an oversized image and use scaling in your compositing software to save a lot of time.
- Always lead your camera view into corners when the camera is traveling along a path.
- Ensure you lighting is set up before you bring the design model into your rendering field. This makes sure the architect has it lit the way they intended.
- Avoid lighting from directly behind your target object. Our goal is to show the building, not just its silhouette. Backlit images also relate a sense of isolation and abandonment, no really what we want to convey when pitching a design.
- Never have the primary light source directly behind the camera. This reduces the surface detail of the shot and makes it appear flat and featureless.
- Use depth of field to draw attention to specific features by forcing everything else out of focus.
- Use the sun to drive shadows across the facades and interiors to create compelling detail shots.
- Still images in detail shots can be shown very briefly and cut between quickly to create a montage of images with a dynamic of their own.
- Still images in detail shots can be rotated and scaled while viewed to create a more dynamic appearance.
- Use the rule of thirds for setting up the composition of still images.
- Use safe frames when setting up animated sequences and any text that may be added during compositing.

The Architectural Film

The architectural walkthrough as a means of communicating a design is truly a failure since it does not allow the designer to control the perception and attention of our audience. Not only is it a failure in communication, it is an expensive failure as it requires far more work to develop areas of marginal interest, requiring more time to render and complete the production.

The architectural film overcomes these failings by its nature of defining the focus of the audience and shortening the individual shots and overall animation into a more easily understood film.

The power of the architectural film is based not in the software, but in the process used to control production. The use of the storyboard to define the scenes and break them down into shots results in better communication with the client. This gives designers the power to tell the story of their design the way they envision it and to communicate that story more quickly, effectively and at a lower cost.