

Animation Lab™

Version 5

Quick Intro & Tutorials

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1 Quick Intro

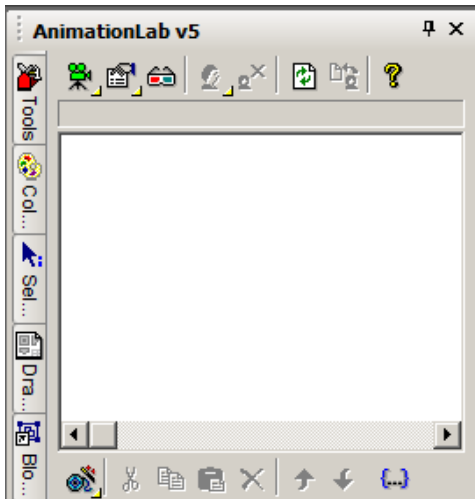
This chapter contains short exercises that demonstrating each of the two animation creation methods: **Key Frame Editor** and **Scenario Script Editor**.

NOTE: Both editors can be used together to create an animation, as will be shown in tutorials in the next chapter.

Key Frames

The Key Frame Editor can be used when you want to record what you see on the screen. You do not need to enter any exact values.

1. In a new TurboCAD file, select **View / AnimationLab Palette**. In the top pane of this palette you can define the “actors” - geometric objects that will be animated. The lower pane is where you define the movements.



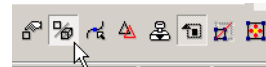
2. There are two methods you can use to define movements: the **Key Frame Editor** and the **Scenario Script Editor**. If the lower section does not look like this, click the ‘Switch to’ icon



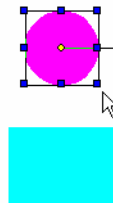
3. This simple example will consist of two objects: a circle and rectangle. For the animation, the circle will move around the rectangle. Create both objects. If you want them to appear solid, adjust the **Pen** and **Brush** properties.



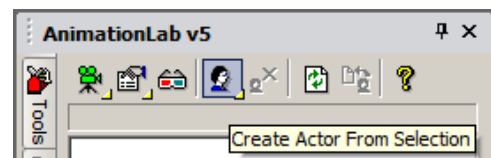
4. Before creating an animation, the file must be saved. Use **File / Save As**, and use any name and folder you wish.
5. When using Animation Lab, you must use the **3D Selector**, even if the objects themselves are 2D.



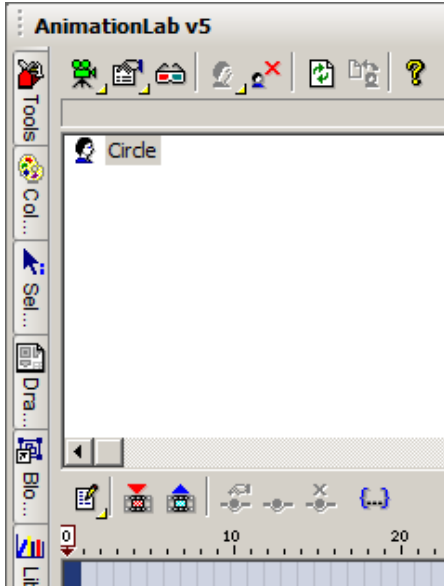
6. Because the circle will be animated (the rectangle will not move in this example), select only the circle.



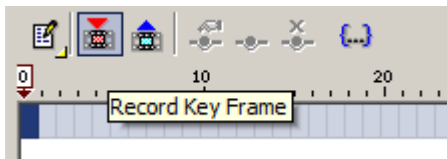
7. Click **Create Actor from Selection**



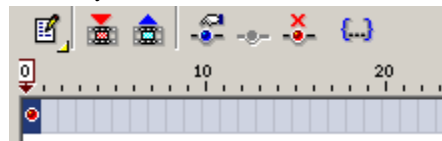
“Circle” is now listed as an actor. In the lower pane, a row of empty key frames is created - anything you define in this row will affect only the circle.



- To record the current position of the two objects as the first key frame, highlight the “zero” key frame. Then click **Record Key Frame**.



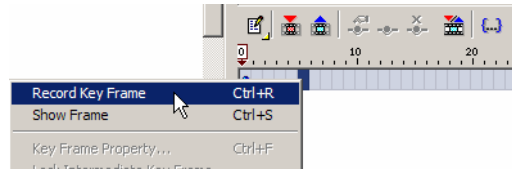
The recorded key frame is filled with a circle.



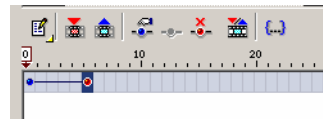
For the next key frame position, move the circle to the right of the rectangle.



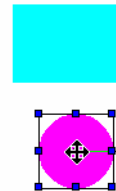
- Move your cursor along the key frame row until “5” is indicated.
- Right-click on Key Frame 5 and select **Record Key Frame**.



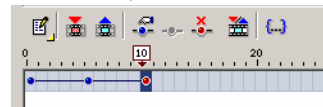
This key frame now has a circle, indicating that it contains a recorded position.



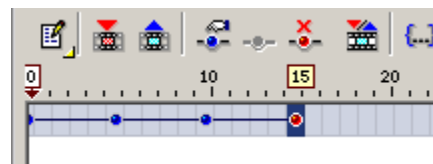
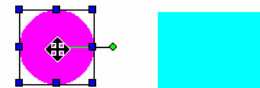
- For the third position, move the circle below the rectangle.



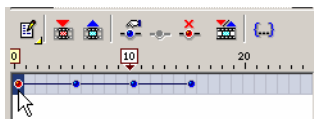
- Double-click on Key Frame 10 to record this position.



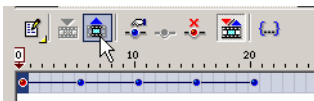
- Move the circle to the left of the rectangle, and record this position at Key Frame 15.



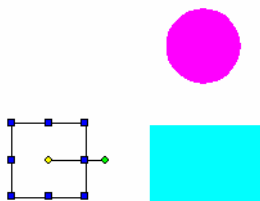
14. The circle's animation should end where it started (above the rectangle), but the current position of the circle is to the left of the rectangle. To return the circle to where it was at originally, highlight Key Frame 0.



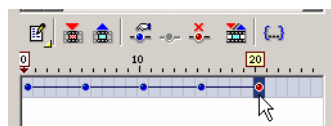
15. Then click **Show Frame**.



Now the circle is back above the rectangle.

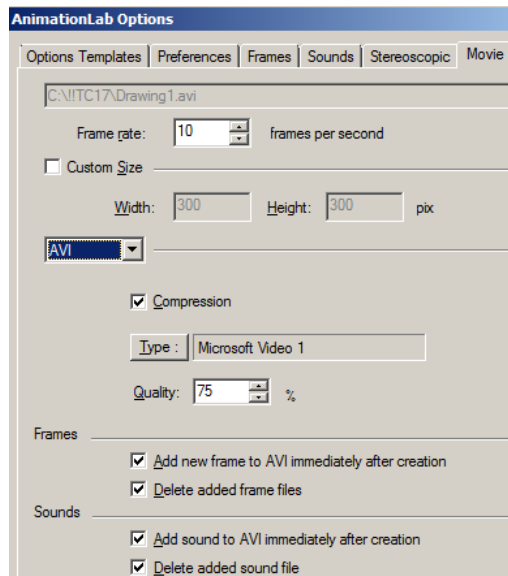


16. Record this position at Key Frame 20.



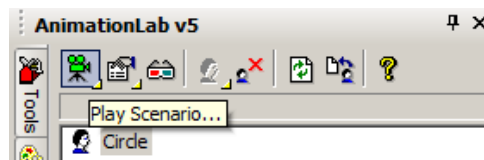
17. Now that all positions are defined, click **Options** to define some of the properties of the animation.

18. Open the **Movie** tab, and define the **Frame Rate** as 10 frames per second. With 20 frames defined, the total animation will take 2 seconds. You can also choose to create the animation in AVI, GIF or MOV format.



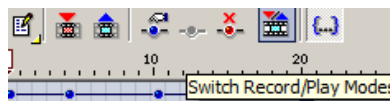
*Tip: If you check **Compression** and select a compression method, you can greatly reduce the file size of the animation.*

19. Now click **Play Scenario**.

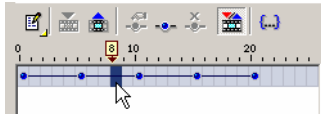


The frames will be compiled, and the animation will start in whatever default application you use for AVI, GIF or MOV files. You should see the circle moving in 4 straight lines, tracking a diamond pattern around the rectangle.

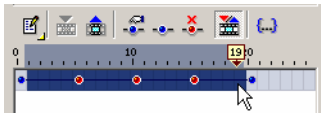
20. If you want to track the animation positions on the TurboCAD file itself, click **Switch Record / Play Modes**.



- You should now be in **Play** mode, with the **Record Frame** icon grayed out. Click on any frame to see the circle's position.



- To see the animation in action, click and drag on the key frame row. Be sure not to start dragging on a recorded frame (one that has a circle), because that will move the recording to another frame.



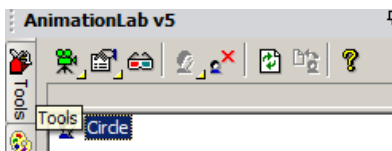
Scenario Script Editor

The Scenario Script Editor can be used when you know exact parameters, such as a move distance, rotation angle, color, path to follow, etc.

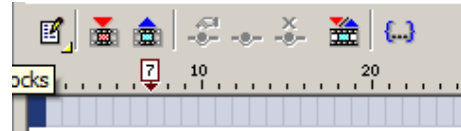
- Start a new file, and save this file under a new name.
- Create one simple object, like a magenta circle.



- Select the circle and make it an actor.



- If you are still in the Key Frame Editor, use the **Switch To** icon to switch to the Scenario Script Editor.



- In this editor, you need to specify the timing of the frames as well the exact parameters of motion. For the first command, use **From** and **To** frames of 0 and 5. For the Command, select **Move**. Enter a **dX** distance of 1.

From	To	Command	dX	dY	dZ
0	5	Move	1	0	0
		New Command			

This means that from Frame 0 to Frame 5, the circle will move one unit to the right **per frame**. So the total distance is 5 units.

WARNING: If you play the animation at any point during its creation, the TurboCAD file will reflect the situation at the **end of the animation so far**. To return to the original state of the objects, use **Undo** as many times as needed. If you do not **Undo**, subsequent animations will occur from whatever is currently displayed onscreen!

- For the second command, use the same Frame numbers, and another **Move** command. This time specify a **dY** distance of 0.5.

From	To	Command	dX	dY	dZ
0	5	Move	1	0	0
0	5	Move	0	0.5	0
		New Command			

NOTE: You could have combined these two commands into one command that has both a **dX** and **dY** value.

The result of these two commands is that the circle will move simultaneously up and to the right.

The next two commands will also occur over the same frames, but will have different movements.

7. The third command will occur over Frames 5 through 10. Use the **Rotate** command with a **AngleZ** = 10. This rotates the circle 10 degrees per frame, for a total of 50 degrees.

From	To	Command	AngleX	AngleY	AngleZ
0	5	Move	1	0	0
0	5	Move	0	0.5	0
5	10	Rotate	0	0	10
New Command					

8. The next command also occurs over Frames 5 through 10. Use **Scale**, with **ScaleX** = 1.15. The X dimension of the circle will increase 15% over each frame.

From	To	Command	ScaleX	ScaleY	ScaleZ
0	5	Move	1	0	0
0	5	Move	0	0.5	0
5	10	Rotate	0	0	10
5	10	Scale	1.15	1	1
New Command					

The result of these last two commands is to scale and rotate the circle simultaneously.

9. The last frame will at the same time as the **Rotate** and **Scale** commands (Frame 5), but will end later (Frame 15). The command is **Property / Pen Color Increase**. Use the **dRed**, **dGreen**, and **dBlue** values shown; this changes the current RGB value of the circle by a small amount over each frame.

From	To	Command	dRed	dGreen	dBlue
0	5	Move	1	0	0
0	5	Move	0	0.5	0
5	10	Rotate	0	0	10
5	10	Scale	1.15	1	1
5	15	PenColorIncr	-8	10	-5
New Command					

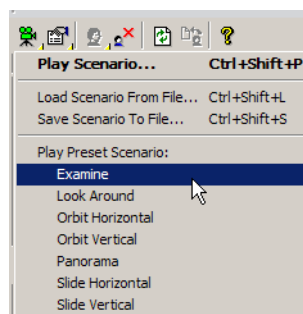
10. Before playing the animation, position the circle on the screen so that its final position (after moving, rotating, etc.) will still be visible onscreen. Otherwise, the circle will disappear from view during the animation. In this case, the circle should be near the lower left corner of the screen.

11. Play the animation. It should start with a circle, which then moves up and to the right. It then simultaneously rotates, stretches, and changes color. The color change continues to occur for a few frames after the rotation and scaling are complete.

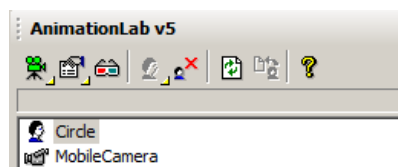


Preset Animations

For a quick way to animate a model, hold the Play Scenario icon. The menu that opens contains several ways to view the model: **Examine**, **Look Around**, etc.



When you use one of these methods, “Examine”, for example, a **Mobile Camera** is added as an actor.



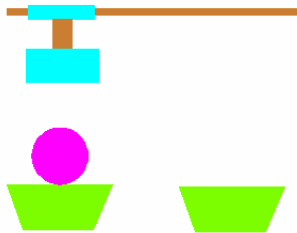
2 Tutorials

This chapter contains several short tutorials that demonstrate some commonly-used features of Animation Lab.

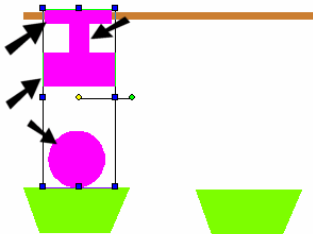
Animating Objects in Tandem

This tutorial will show how to create a multi-object, 2D animation.

1. Use rectangles, polylines and a circle to create objects like these in TurboCAD. In this simple animation, the magnet will drop down, pick up the metal ball, move back up, and then slide to the right. Then it will drop the ball onto the holder on the right.

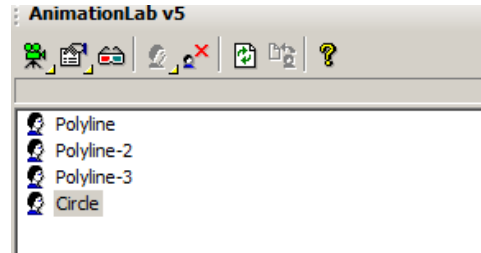


2. Only four of these objects will move. Select them, making sure you are in **3D Selector** mode.

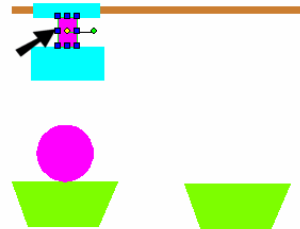


3. In the Animation Lab palette, click **Create Actor**.

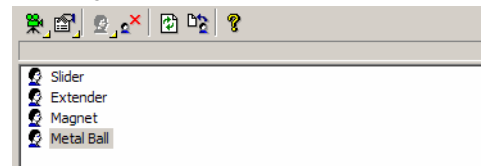
The four shapes are now listed as actors. However, the names are not very informative.



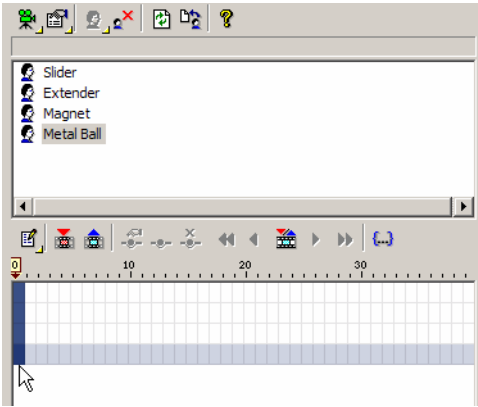
4. To see what shape an actor represents, highlight it. The corresponding object is selected on screen.



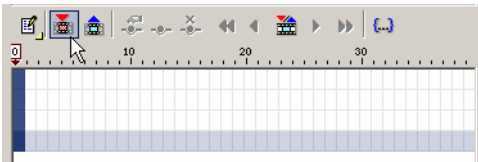
5. To rename an actor, highlight it and then click on it again. You can then overwrite the default names with more logical names, like these:



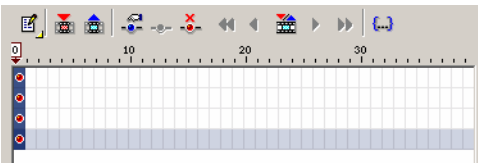
- Make sure you are in Key Frame Editor mode. Each actor has a corresponding row of key frames. To record the first set of frames, highlight the first column. You can click the column header, or click and drag from top to bottom in this column.



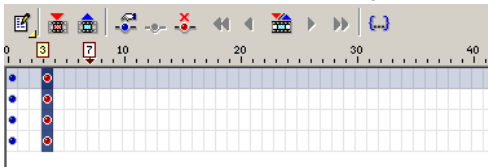
- Click **Record Key Frame**.



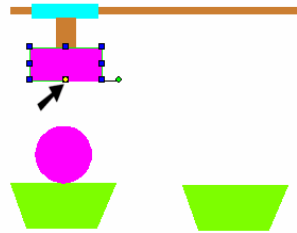
The initial position of the four actors is recorded in this first key frame.



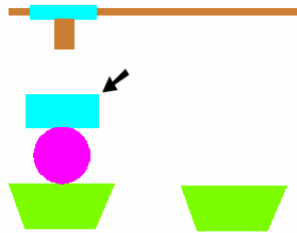
- To keep the scene still for a moment in the animation, record the same positions in Key Frame 3. This means that from Frame 1 to Frame 3, nothing will move.



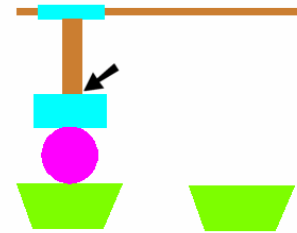
- The next step is to position the objects where they will be after the first set of movements. First, select the rectangle representing the magnet. You can move it by eye, but to be more exact you can press D to move the reference point to the midpoint of the lower line.



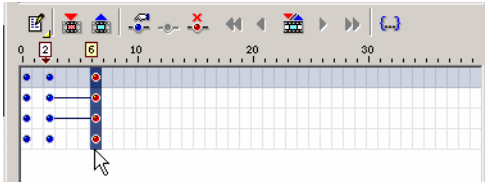
- Move the magnet straight down so that it sits directly on top of the metal ball.



- For the extender bar, use the drag handles in **Select Edit** mode to extend it to the dropped magnet.

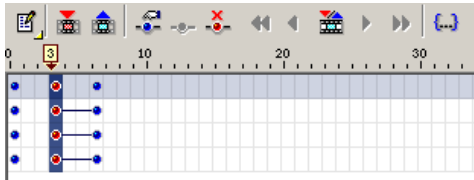


- To record this position, select the entire column for Key Frame 6 and click **Record**. (You can also double-click anywhere in the highlighted column to record each key frame.)

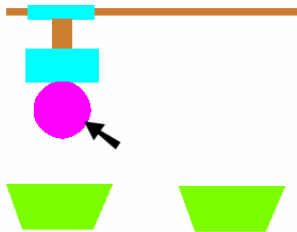


At any point while creating an animation, you can check your progress in **Play** mode, or by clicking **Play Scenario**. Remember, the file must be saved before the animation file can be generated.

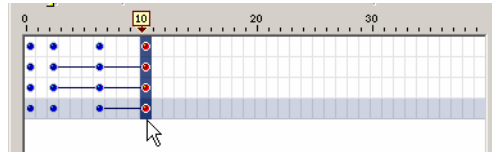
- The magnet must now go back up, taking the ball with it. To return the magnet and extender to their original positions, highlight the column for Key Frame 3 and click **Show Frame**.



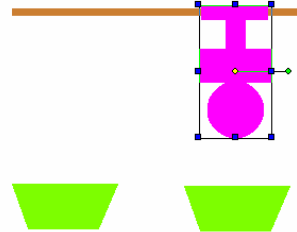
- Now move the ball up to meet the magnet.



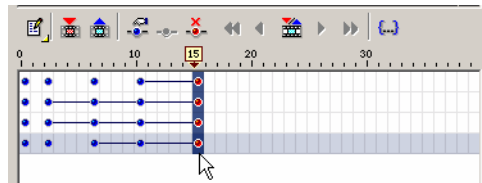
- Record these positions at Key Frame 10. Note that there are lines between some of the recorded points. This represents movement, such as the ball moving up or the magnet moving down. The row for the slider contains no movement lines yet.



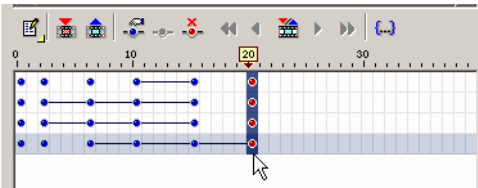
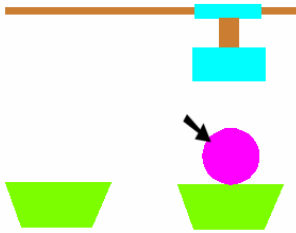
- Select all four actors and move them to the right (Ortho mode helps here), ending when the ball is positioned above the center of the holder on the right.



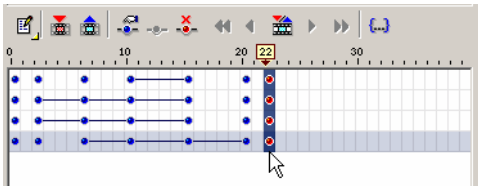
- Record this at Key Frame 15.



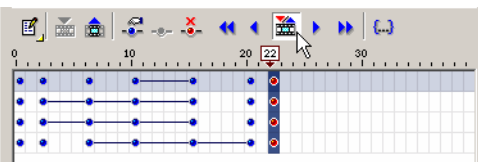
18. Finally, move the ball so that it sits on the holder. Record this at Key Frame 20.



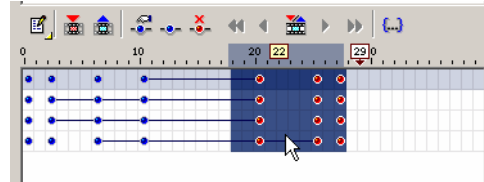
19. Like at the start of the animation, record these positions for another 2 key frames so that the final position will be still for a moment.



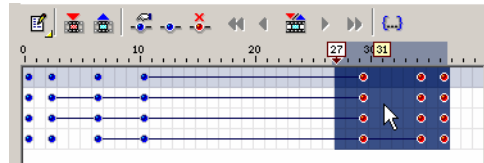
20. The short animation is now complete. To view it on screen, switch to **Play** mode. You can use the forward and back buttons to view the positions of individual actors, or for an entire column of key frames.



21. Once the animation is created, there are several ways to edit it. One way is to move an entire block of key frames. In either **Play** or **Record** modes, click and drag to select these frames. (Be sure to place the initial click on a frame that has no recording, otherwise you will move that recording.)

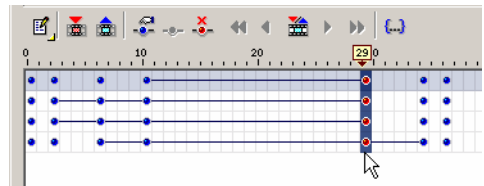


22. With the block selected, drag it to the right.

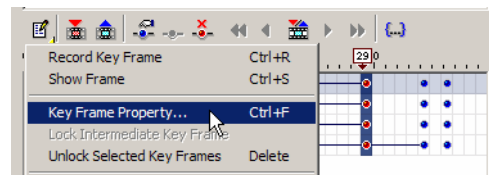


This lengthens the time it takes the slider to carry the magnet and ball to the right.

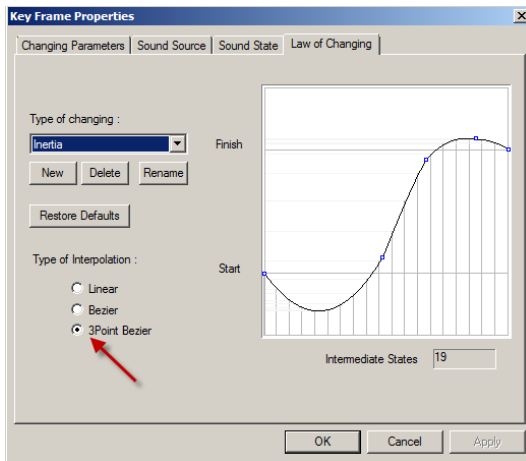
23. Lastly, highlight the column at the end of the slider movement.



24. Right-click, or click and hold the **Switch To** icon. Select **Key Frame Property**. You can modify properties of a single key frame this way, or multiple ones.



25. Open the **Law of Changing** tab, and set an **Inertia** type of movement, based on a **3 Point Bezier** curve. You can drag control points on the preview curve on the right to set how you want the motion to proceed. Click 'OK' to set this motion.



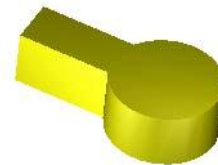
26. Play the movie again. Now the slider motion is not linear; it moves according to the inertia curve.

Combining Key Frame and Scenario Script Editors

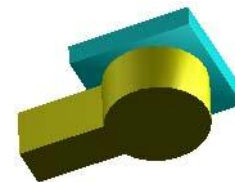
The two editors can be used together. This can be handy if you want to specify some motions with exact parameters, while other motions will be created by scene placement.

This animation will simulate a helicopter (in very basic form) whose rotors maintain their spinning motions before and during the helicopter trip.

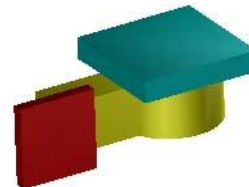
1. Use a 2D **Polyline** and **Simple Extrude** to create the basic helicopter body.



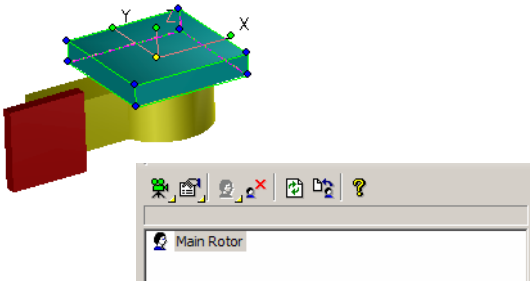
2. Change the workplane as needed (use **Workplane by Facet**) to place a shallow **Box** on top of the body.



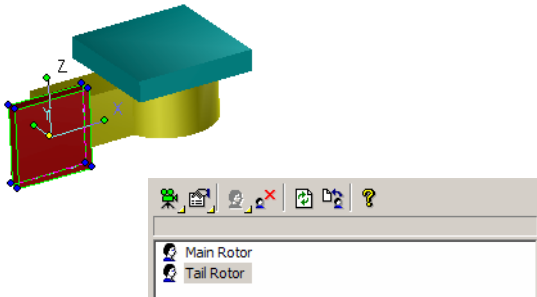
3. Change the work plane again to place another box on the side.



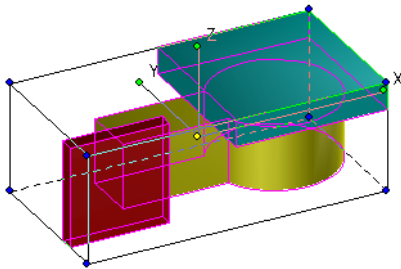
4. Select the top box and make it an actor. Change the name to "Main Rotor."



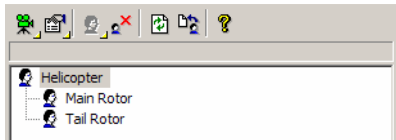
5. Do the same for the tail rotor.



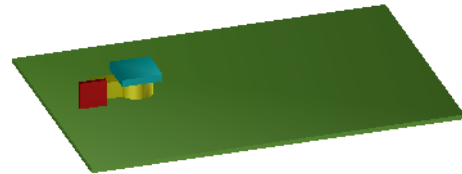
6. Because the entire helicopter will move as one unit, select all three solids and group them (**Format / Create Group**).



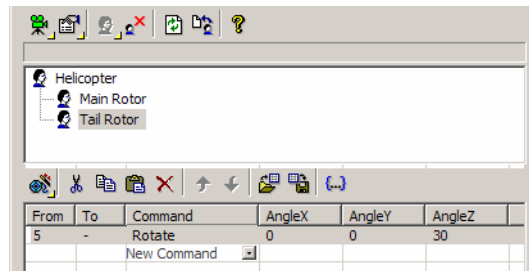
7. Make this group an actor as well, named "Helicopter." It automatically contains the two rotor actors.



8. To more easily define the limitations of movement, reset the work plane and create a shallow box for the ground plane. It is also helpful to use a **Window Layout Template** so that you can access several views at once. The most useful views in this case are **Front**, **Plan**, and **Iso**.

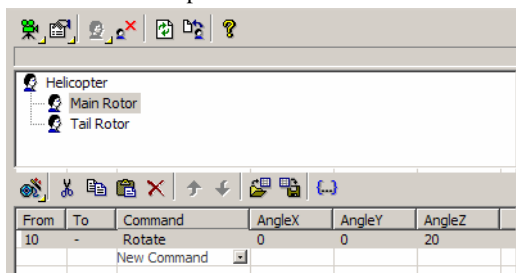


9. The first motions to define are the spinning of the rotors. Select the Tail Rotor and make sure you are in Scenario Editor mode. This motion should start at Frame 5, with no end motion defined, so that the motions never stop. For **Command**, select **Rotate** with an **AngleZ** of 30. This means that in each frame, this rotor will turn 30 degrees.

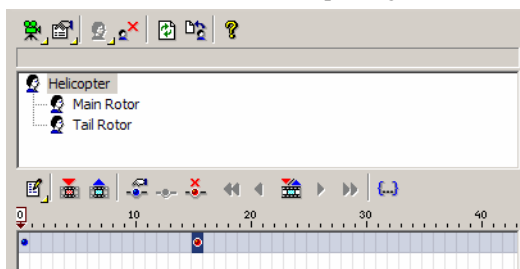


NOTE: It seems logical that the Tail Rotor would spin about the model's X axis. But actual, this box spins about its own (local) Z axis.

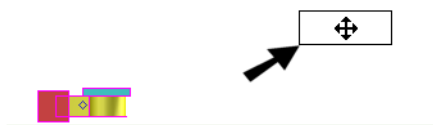
10. Start the Main Rotor spinning at Frame 10, with similar rotation parameters.



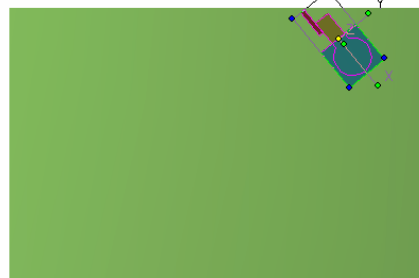
11. Now the motions of the helicopter itself can be defined. Switch to Key Frame Editor. Record the initial position at both Frames 0 and 15. This allows the helicopter to sit on the ground while the tail rotor, and then the main rotor, start spinning.



12. For the next position, move the helicopter group up and to the right.



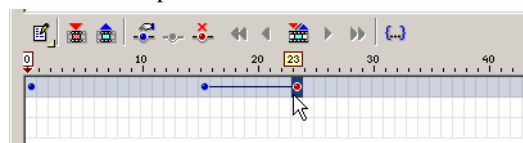
13. In **Plan** view, adjust the position and rotation to be above the corner of the ground plane.



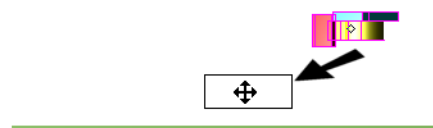
Check the position in Iso view as well:

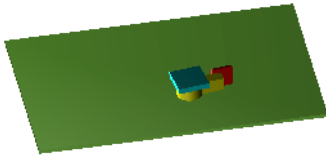
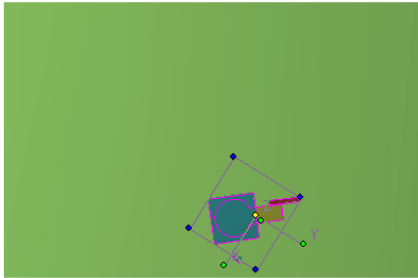


14. Record this position at Frame 23.

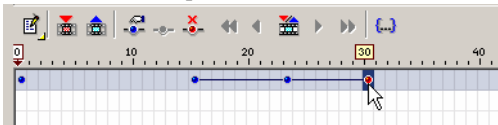


15. Move the helicopter back down and to the left for the next position. Rotate as needed.

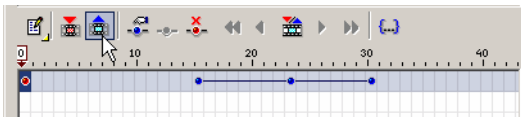




16. Record this final position at Frame 30.



17. If you have played the movie at various steps while creating the animation, the helicopter will change position. To return to the original position, switch to Key Frame Editor mode, highlight Frame 0, and click **Show Frame**.

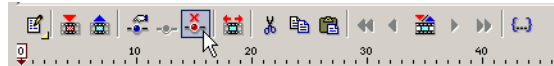


18. Save the file (if you haven't already) and play the movie. You should see the following steps:
- Helicopter stationary on the ground
 - Tail rotor starts spinning
 - Main rotor starts spinning
 - Helicopter takes off for the first recorded point, with movement and rotation achieved incrementally (rotors continue spinning)
 - Helicopter arrives at second recorded point

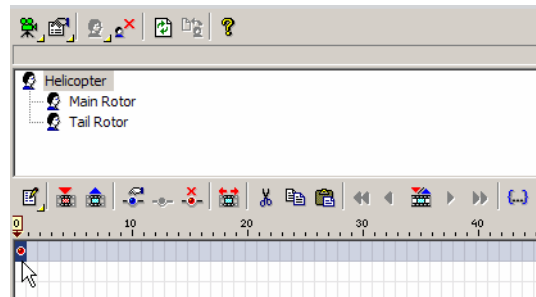
Defining a 3D Path

Continuing with the same model, we will change the helicopter's path by defining a 3D spline.

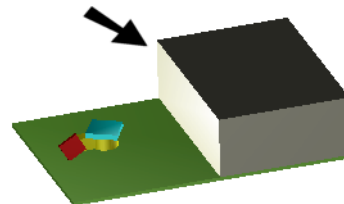
1. In Key Frame Editor mode, delete all recorded motions except the first one (in the original position). You can do this by highlighting one or more frames and clicking **Unlock Selected Key Frames**.



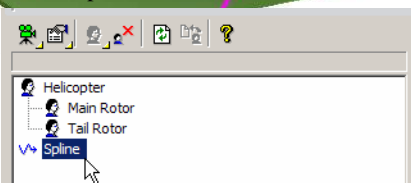
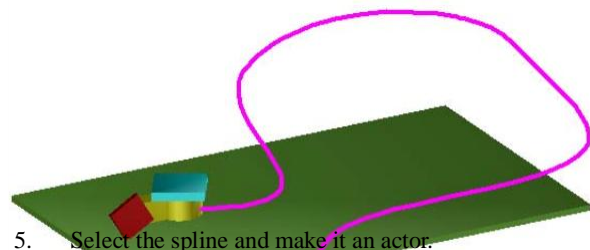
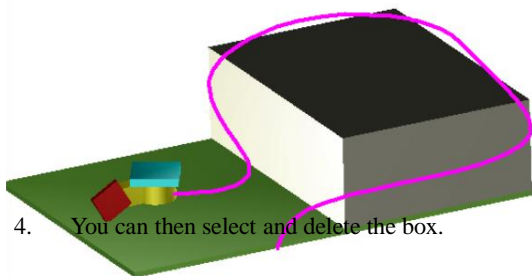
This is what you should see in Key Frame Editor:



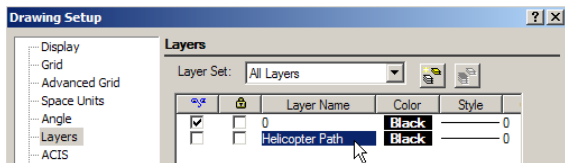
2. As a basis for the 3D spline, create a large **Box** on the ground plane.



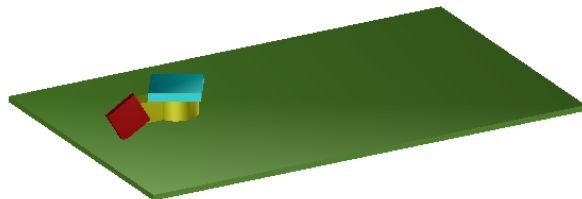
- Use **3D Spline by Fit Points** to create a spline like this. Start near the front of the helicopter and use points along edges of the box to create the spline.



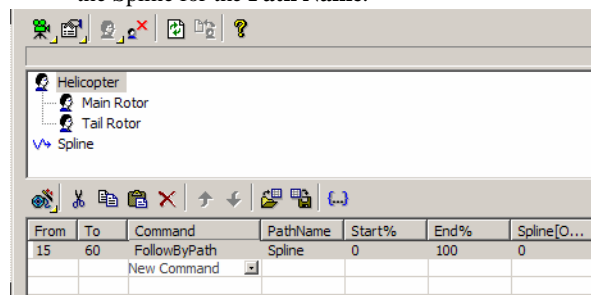
- Since you probably don't want to see the actual path of the helicopter, create a new layer for it and make it invisible.



- Place the spline on this layer, and it disappears.



- The **Rotate** commands for the two rotors should still be listed in the Scenario Editor. Highlight the helicopter group, and start this new command at Frame 15 (again, to give the rotors time to start spinning). For the **Command**, select **Path / Follow by Path**. Select the Spline for the **Path Name**.



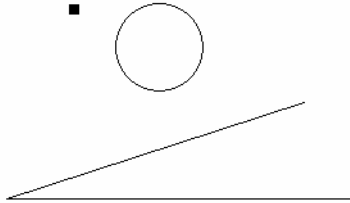
- Play the movie. You should see a similar movie as before, but the helicopter follows and aligns itself to the 3D spline.

*NOTE: If you had selected **Slide by Path**, the helicopter would follow the path but would not align to it.*

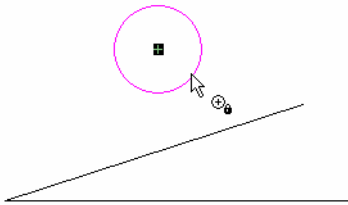
Animation and Constraints

You can constrain geometry and animate objects to show how these constraints affect animations.

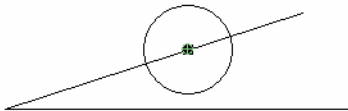
1. Start with these four objects: a horizontal line, a diagonal line starting at the first line's endpoint, a point, and a circle.



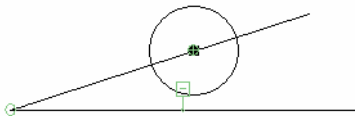
2. Assign a **Concentric** constraint to the point and circle.



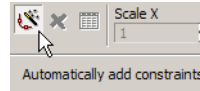
3. Assign a **Coincident** constraint to the point and diagonal line.



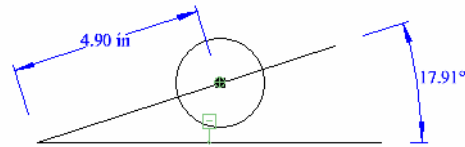
4. Add another **Coincident** constraint to the common endpoint of the two lines, and a **Horizontal** constraint to the horizontal line.



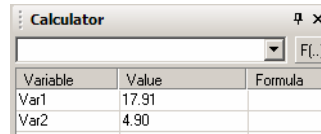
5. The next step is to add dimensions, but first make sure that **Auto Add Constraints** is active. This way, the dimensions you add will become variables in the Calculator palette.



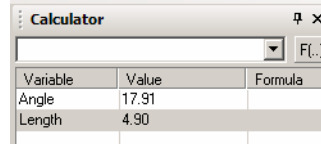
6. Add these two dimensions: **Parallel** between two points and **Angular** between the two lines.



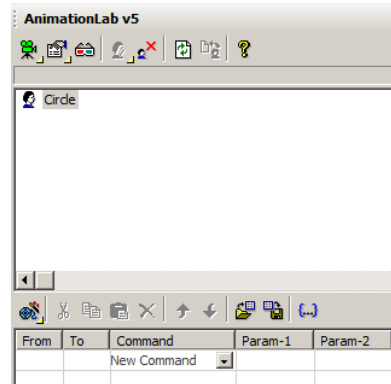
7. Open the Calculator palette to see the variables for these two dimensions.



8. If you like, change the variable names to something more logical.



9. Select any object in the file and make it an actor. (You can also create a dummy point and make it the actor.)



- Make the Scenario Script Editor active. The animation will move the circle along the line, and it will also rotate the diagonal line.
- The first command will not move the circle, but it sets the dimension value. (It does not matter what the current values of the dimensions are; this line can be used to set a new value.) For Command, select **Constraint / Set Variable**. The Variable Name should be the name of the length dimension variable, with quotation marks around it.

From	To	Command	VariableName	Value
0	5	SetVariable	"Length"	0.75
New Command				

The above line sets 0.75 as the distance from the circle center to the lower end of the line.

- Use the second command to do the same for the angular dimension. The circle will start moving before the line starts rotating, so make this command last a few more frames than the previous one.

From	To	Command	VariableName	Value
0	5	SetVariable	"Length"	0.75
0	8	SetVariable	"Angle"	10
New Command				

- The third command starts the circle moving. In this example, the new length value is $0.75 + \text{StepNum} * 0.5$. This means that the initial length is 0.75, and increases by half the frame number with each passing frame.

From	To	Command	VariableName	Value
0	5	SetVariable	"Length"	0.75
0	8	SetVariable	"Angle"	10
5	15	SetVariable	"Length"	$0.75 + \text{Stepnum} * 0.5$
New Command				

- The last command starts the line rotating. Start at the original angle of 10 degrees, and increase each frame by 3 times the frame number.

From	To	Command	VariableName	Value
0	5	SetVariable	"Length"	0.75
0	8	SetVariable	"Angle"	10
5	15	SetVariable	"Length"	$0.75 + \text{Stepnum} * 0.5$
8	15	SetVariable	"Angle"	$10 + \text{Stepnum} * 3$
New Command				

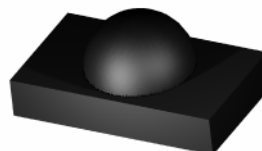
- Play the movie. You should see stationary objects and the circle will move up along the line. Then the diagonal line will rotate around the horizontal line.

Animating Lights

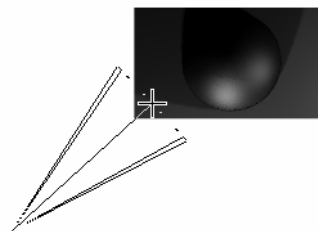
This tutorial shows how to animate lights moving across an object. One animation will be created in the Key Frame Editor, the other in the Scenario Script Editor.

Key Frame Editor

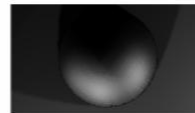
- Start with an object like this - a **Box** with a **Hemisphere** on top.



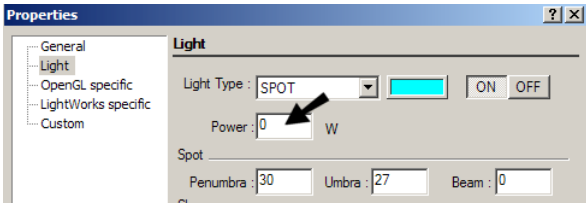
- In **Plan** view, use **Insert / Light / Spot** to create a light that projects onto the object.



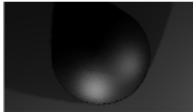
- Create a second light projecting onto another corner.



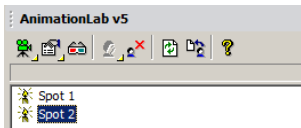
- Use the **Properties** of the lights to set different colors for each light. And because initially the lights will be off, set the **Power** to zero.



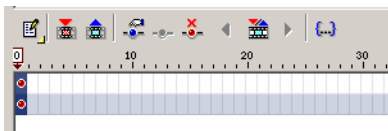
With two different colors assigned to the lights, the light indicators should look like this:



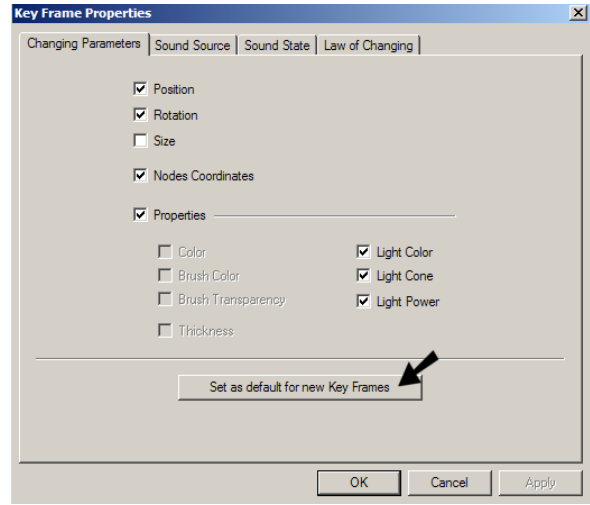
- Select both lights and make them actors.



- Use the Key Frame editor to record these initial positions, colors, and power levels.

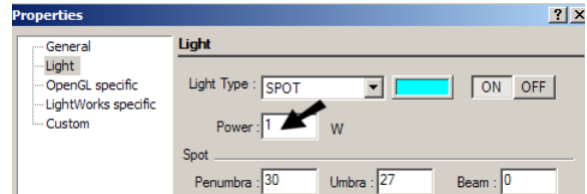


- Open the **Key Frame Properties** for one of the recorded frames. (You can do this by double-clicking on a recorded frame, or by clicking the **Edit Selected Key Frame Property** icon.) On the **Changing Parameters** tab, check **Properties**. Then check all those relevant for lights - **Color**, **Cone**, and **Power**.

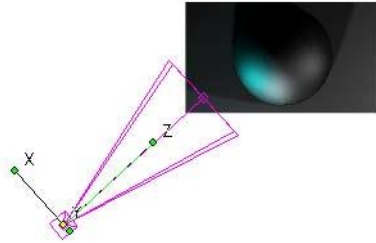


With these options active, any change you make to the lights' colors, power, etc. will be recorded.

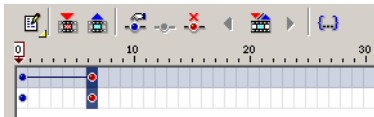
- For the next frame, assign a value for **Power** for one of the lights - this in effect turns on the light.



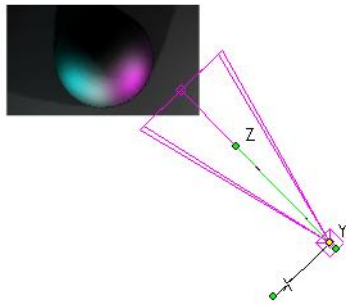
You should now see a light from the one that was turned on. The other light should remain off.



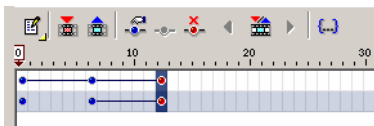
- Record this position for both lights. Only the light that was turned on should have a connecting line between frames; the other light does not change.



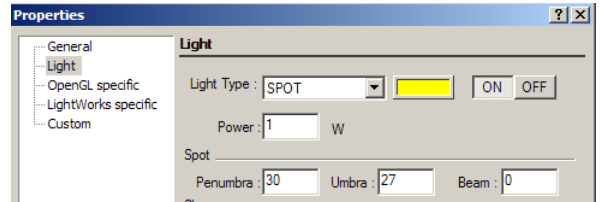
- Now, turn on the other light.



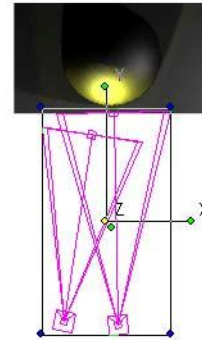
- Record this position for both lights. You have now recorded both lights off, one light switched on, then the other light switched on.



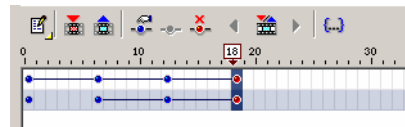
- Now change the color for one or both lights.



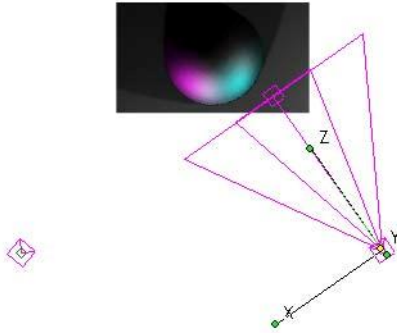
- Select, move, and rotate each light so that the light projects onto the front of the object.



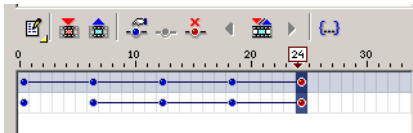
- Record these new positions. Both the color and position changes will be recorded.



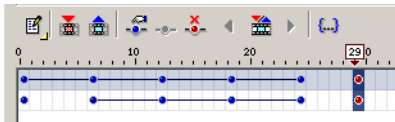
15. Move and rotate each light again, so that each light ends up at the opposite corner from its previous location. Change the colors again, and for one of the lights, increase the **Cone** angle.



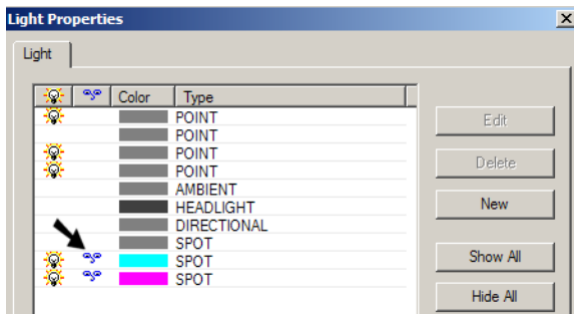
16. Record this final position.



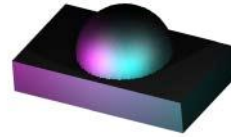
17. To leave the lights at this location during the animation, record these positions again a few frames later.



18. If you want to hide the light indicators, select **View / Lights**. The “face” icon controls visibility - toggle this icon to high the lights. Otherwise, the indicators will appear in the animation.



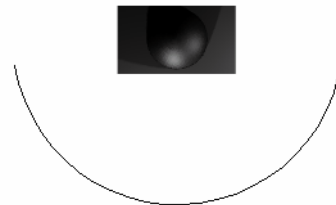
With the indicators off, you should only see the object and reflected light.



19. Save the file and play the animation. You should see:
 - Both lights off
 - One light switched on
 - The other light switched on
 - Both lights moving toward the center while simultaneously changing color
 - Both lights moving toward the opposite color, changing color again, with one light growing stronger.
 - The final light position sustained for a few frames

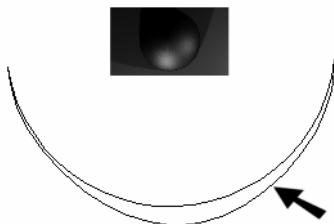
Scenario Script Editor

1. Keep the same model, but delete all frames you recorded in the Key Frame Editor. You can do this by selecting all recorded key frames and pressing Ctrl+X, or by clicking the **Unlock Selected Key Frames** icon.
2. Delete the lights as well.
3. In **Plan** view, use **Arc Center and Radius** to create an arc like this, using the center of the hemisphere for the center of the arc. This arc will be the path by which one light will move.

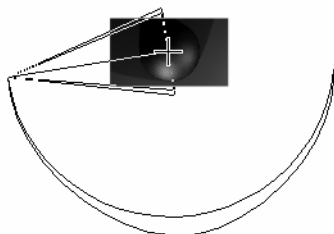


For the path for the other light, you cannot use the same arc. One problem with using arcs and circles as animation paths is that you cannot control their start points. An arc like the one above will always be drawn counter-clockwise.

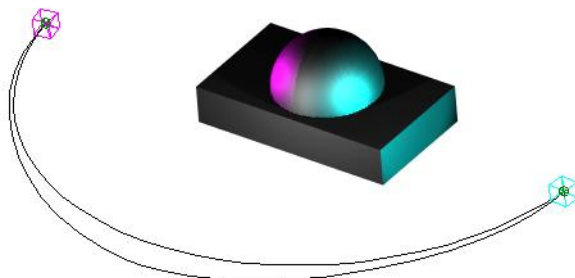
- Instead, draw a similar shape using a **Bezier** curve. Splines and Bezier curves make good paths because they proceed in the order you set.



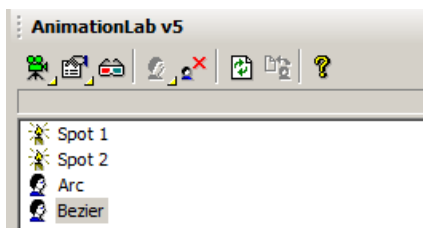
- Create spot lights at the ends of the arc, making them point toward the center of the hemisphere.



- As before, assign different colors to each light.



- Select the two lights, the arc, and the Bezier curve, and make them actors.



- Switch to Scenario Script Editor, and start with the light on the left. For the first few frames (1 through 5), use the command **Light / Light Switch**. Set its value to zero, which means that for these frames, this light is off.

- For the next group of frames (5 through 10), turn the light on (**Light Switch** = 1).

From	To	Command	On/Off
0	5	LightSwitch	0
5	10	LightSwitch	1
New Command			

- For the next group, use the command **Path / Follow by Path**. For the path itself, choose the Arc.

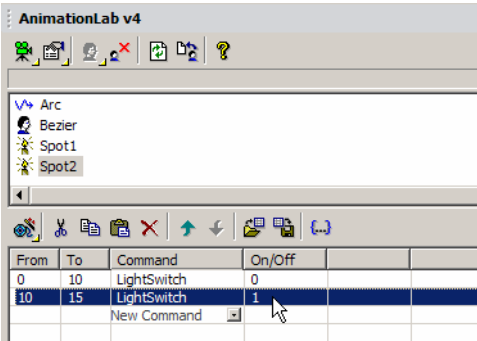
From	To	Command	PathName	Start%	End%	S
0	5	LightSwitch	0			
5	10	LightSwitch	1			
15	35	FollowByPath	Arc	0	100	0
New Command						

- The next group should overlap the previous one; in this example, this group starts when the light is halfway around the arc (Frame 22), and ends at the end of the arc (Frame 35). The command is **Light / Light Color**, and the resultant color will be green.

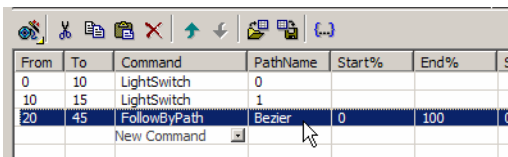
From	To	Command	Red	Green	Blue
0	5	LightSwitch	0		
5	10	LightSwitch	1		
15	35	FollowByPath	Arc	0	100
22	35	LightColor	0	255	0
New Command					

Unlike with the Key Frame Editor, this color switch occurs instantaneously at the specified frame, rather than gradually over the course of the frame group.

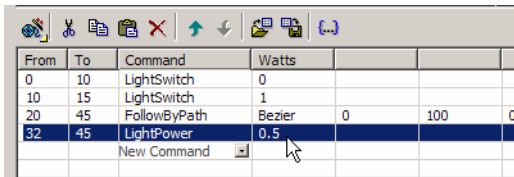
- Now select the light on the right side. Use the same commands to turn the light off, then on. In this example, the light switches are staggered - this light is turned on at a later frame than the other light.



- For the next command, use **Follow by Path** and select the Bezier curve as the path.



- While moving on this path, use **Light / Light Power** to reduce the wattage of the light.



- If you want, hide the light indicators, and place the arc and Bezier curve on invisible layers.

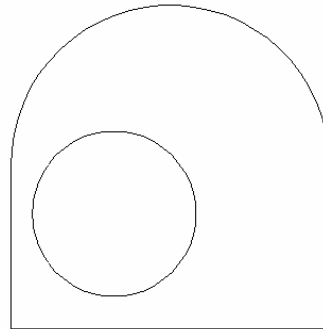
- Play the animation. You should see:

- Both lights off
- Left light on
- Right light on
- Left light starts moving along arc, switches color
- Right light starts moving along Bezier curve, changes power.

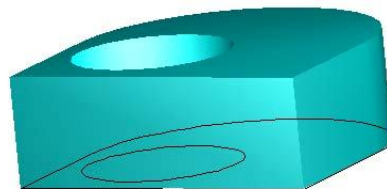
3D Objects Created from Profiles

3D objects that are created from profiles (**Extrude**, **Loft**, **Revolve**, etc.) can be animated by changing the profiles on which they are based.

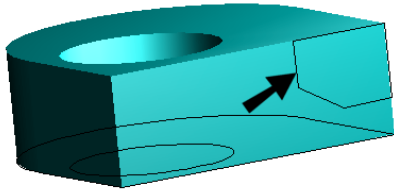
- Start with a circle and a polyline.



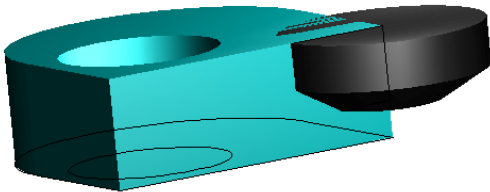
- Activate **Simple Extrude** and make sure **Use Compound Profile** is on. Use Shift to select both the circle and polyline, and extrude both.



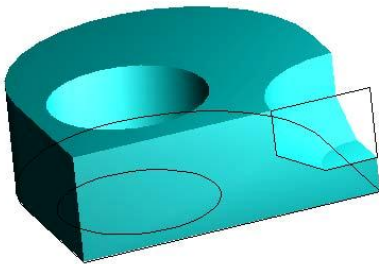
- Use **Workplane by Facet** to set the workplace to a vertical face, and create a closed polyline on the corner like this:



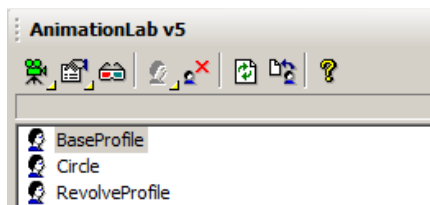
- Use **Revolve** to create a 360-degree revolution of the profile.



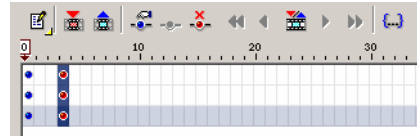
- Use **3D Subtract** to remove the revolved object from the main object.



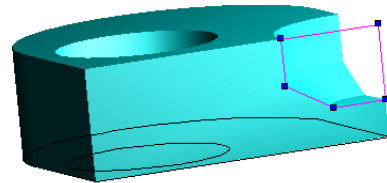
- Select both polylines and the circle (not the solid objects), and make them actors.



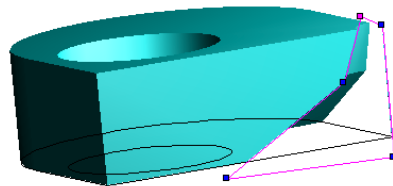
- Record the current position for all three objects. Record again a few frames away, so the animation will not move right away.



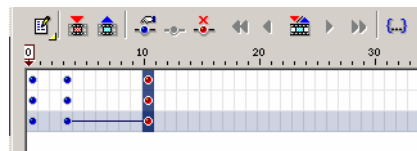
- Select the revolve profile and node-edit it (right-click and select **Edit Tool**). You should see nodes at each corner.



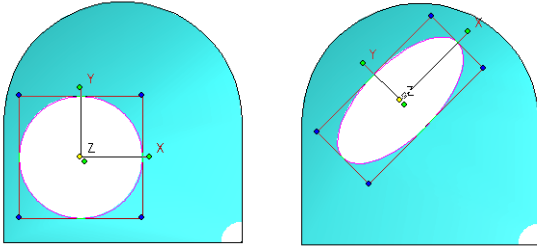
- Drag the nodes to change the profile shape, which in turn changes the revolved shape removed from the main object.



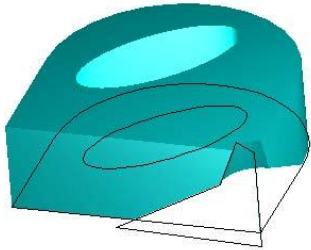
- Record this new position.



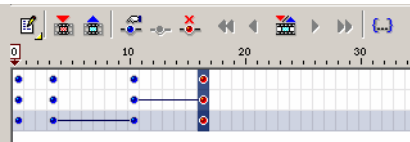
11. For the next change, select the circle. In **Select Edit** mode, move, scale, and rotate it to change the hole.



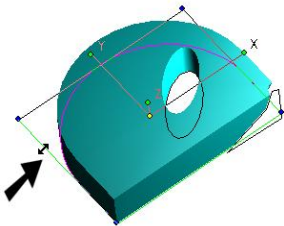
The hole should now look like this:



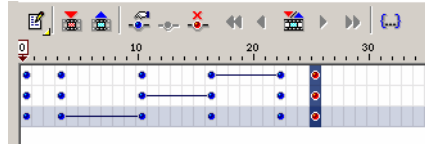
12. Record this position.



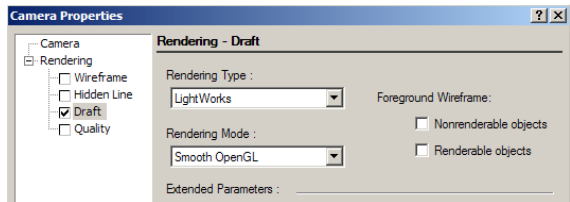
13. For the last change, select the polyline that defines the outline of the main object. In **Select Edit** mode, scale the polyline to make it larger.



14. Record this position, and re-record it a few frames away so that this position will remain still during the animation.



15. If you want to show only the 3D objects, and not the 2D objects, select **View / Camera / Properties**. For **Draft** or **Quality** rendering (whichever you are using), uncheck **Nonrenderable objects**.



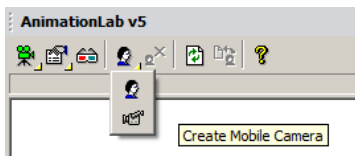
16. Save the file and play the animation. You should see:

- The initial object
- A change in the subtracted revolve object
- A change in hole position and size
- Increase in the overall size of the main object

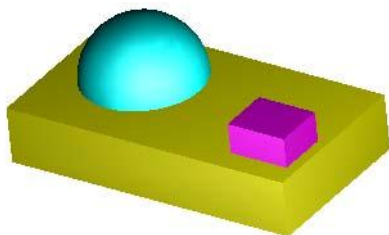
Animating the Camera

You can record a camera's position to create a fly-around animation of an object.

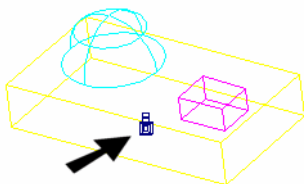
NOTE: You can always insert a mobile camera into your model by holding the **Create Actor** icon and selecting **Create Mobile Camera**.



1. Start with an object like this:



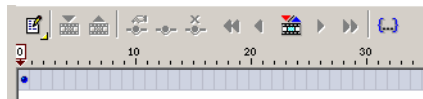
2. Insert a camera of the current view, using **Insert / Camera / By View**.
3. To see this camera, select **Window / New Window**.



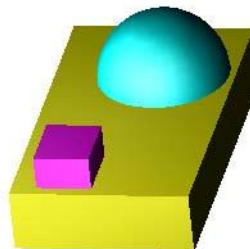
4. Select the camera and make it into an actor. The new window is no longer needed, so you can close it.



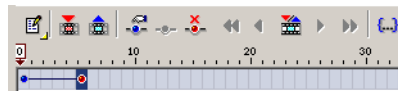
5. Record this initial camera position.



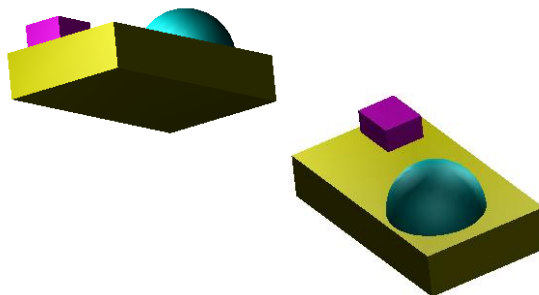
6. Spin around to the next view you want to see.



7. Record this new camera position.



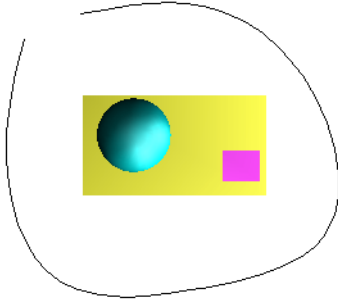
8. Continue creating new views, recording each one.



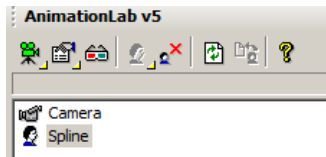
9. Save the file and play the animation. You should see the object spinning around to each view you recorded.

Another way to record a moving camera's view is to define the camera's path.

1. Remove all previous recordings.
2. In **Plan** view, create a spline or Bezier curve surrounding the objects.



3. Insert a camera at one end of the spline, that faces toward the object.
4. Select the spline and camera, and make both actors.



5. Use the Scenario Script editor to create two commands: **Camera / Position by Path** and **Camera / Look by Path**.

From	To	Command	Param-1	Param-2	Param-3
0	20	CameraPosByPath	Spline	0	100
0	20	CameraLookByPath	Spline	0	100
		New Command			

6. Run the animation, and the camera should follow the spline around the object, while turning to match the spline as well.