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Introduction

What is Ashlar-Vellum Kinetics?

Ashlar-Vellum Kinetics is a 3D scene building, sharing, rendering, animation, and automation application. It supports importing native and standard 3D file formats to build 3D scenes that can yet be exported into many file formats.

Ashlar-Vellum Kinetics was designed to be very easy to use, with a short learning curve, without limiting its users’ capabilities.

Ashlar-Vellum Kinetics Interface

Ashlar-Vellum Kinetics new interface is based on selecting the workbench to work on first. Upon selecting any workbench the Workbench tasks, Properties, Task, and Library panels in the interface will be changed to display the defaults of that selected workbench.

On the left hand side of Ashlar-Vellum Kinetics interface, the user can find six icons. Each icon refers to a workbench in Ashlar-Vellum Kinetics. The icons will be active according to available license(s).

As shown in the above image, the application interface has different sections.
1 Workbench Bar

From the workbench bar the user can select the workbench to use. The workbenches in this bar will be available based on the acquired license. The available workbenches are as listed below, and each application and its corresponding functionalities are described in separate sections.

2 Workbench tasks

Different workbenches in Ashlar-Vellum Kinetics provide the user with different tasks. The Workbench tasks, the Properties, Task, Library panels will all change according to the selected workbench. For example in the Scene Building workbench this section will include the tasks shown in the image below.

Each task within a workbench will change the Kinetics interface to help the user perform the task easier. For example selecting the File task will show the material library in the Library panel. Changing to the Object task will show the Object library instead.
Some tasks like the Camera task, in the Scene Building workbench, will have no effect on the library panel. This can help advanced users to mix between workbenches. For example going to the Automation application will set the Script library, in the library panel. Going back to the Scene Building application – Camera task the Script library will still be set, allowing the user to use/apply script there.

**3 Tree/Task panel**

This section usually displays the Object Tree, with its two formats; Basic and Advanced.

In the basic tab, the tree will show the images for the selected geometry, and all the way up to its top parent.

The advanced tab shows the assembly structure of all assemblies in the scene. Ashlar-Vellum Kinetics maintains the assembly structure of imported 3D geometry, in the Object Tree. Maintaining the assembly structure enhances the usability of 3D model(s), as it allows a user to move parts/assemblies, reassign materials, and hide/show geometries easily. Click the top level View menu, then select Object Tree to display the tree structure of the 3D scene.

By default, picking selects a 3D Geom ( ), which is the leaf level in the assembly tree. A user can then navigate up the tree in one of the following ways:

- Double clicking, selects the top level assembly of the tree.
- Holding Shift while double clicking moves up the tree one level at a time. So repeating Shift + double click eventually will reach the top level assembly of the tree.
- Finally, the user can select the desired branch directly from the tree.

Holding Ctrl key allows for selecting multiple geometries. All draggers and functions can then be applied to the multiple selected geometries. Sometimes this panel displays application specific functions, like Render Settings, when the Rendering workbench is selected.

### 4 Common toolbar

Regardless of the selected workbench, in Ashlar-Vellum Kinetics, this toolbar will be displayed on top of the 3D area. It provides the user with different functions to set the view of the 3D area, as described below, starting from left to right.
**Default View**

This function allows the user to set the view orientation for the active viewport, to one of the default view orientations.

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
<th>Short Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select one of the default view orientations, ISO, Top, Bottom, Front, Back, Right or Left</td>
<td>Ctrl + 7</td>
</tr>
<tr>
<td></td>
<td>Top View</td>
<td>Ctrl + 1</td>
</tr>
<tr>
<td></td>
<td>Bottom View</td>
<td>Ctrl + 2</td>
</tr>
<tr>
<td></td>
<td>Front View</td>
<td>Ctrl + 3</td>
</tr>
<tr>
<td></td>
<td>Back View</td>
<td>Ctrl + 4</td>
</tr>
<tr>
<td></td>
<td>Right View</td>
<td>Ctrl + 5</td>
</tr>
<tr>
<td></td>
<td>Left View</td>
<td>Ctrl + 6</td>
</tr>
</tbody>
</table>

**Hide/Show assessing geometry**

Assessing geometry in Ashlar-Vellum Kinetics can be paths, cameras, and lights. This function allows the user to hide/show any of the geometry in the scene at any time.

**Fit All**

This function automatically updates camera to fit all geometry in the scene within the active view area.

**Zoom to object**

This function updates the camera in the active viewport, to zoom to the selected object. In case the user presses this button without selecting an object, a message will be displayed on top of the 3D area asking him to do so.

**Switch between Parallel and Perspective view**

This function switches the camera between perspective and parallel modes, in the active viewport. For engineers who are used to parallel mode, this option would be helpful.
Rubber band

This function can change the selection mode in the 3D area, and it has three options.

- Rubber Band Selection; changes the selection icon to a square band, and allows the user to window select more than one geometry in the 3D area.

- Append To Current Selection; the selection icon will show a ‘+’ sign inside the square band. The user can window select more geometry in a different section of the 3D scene, without losing the previous selection, as shown in the image below.
- Remove from Current Selection; with a ‘-’ sign added to the band, the user can remove geometry form selection, without losing previous selections. In the image shown below, some geometry where removed from the selections made in the previous two options.

Window Configuration

This button allows the user to select the number of views, in the 3D area. The user can select to have:

Views can also be displayed by pulling the right and bottom edges of the 3D area.
Pick Mode

When starting Ashlar-Vellum Kinetics the default picking mode is enabled. Picking returns two values; a location and a normal direction. The user can change the picking mode.

The picking modes in Ashlar-Vellum Kinetics are:

1. **Default Pick**: in this mode the user picks a point in the model. The location and the normal direction at that point are returned. The geometry at the picked location will be selected in the Object Tree, and its bounding box will be displayed in the 3D area.

2. **Pick Edge End Point**: this picking mode will highlight the edge closest to the selected point, and the returned normal will be tangent of the curve at the closest end. In the image shown below, we selected the door’s edge and the selection point was closer to the bottom side of the door. Thus the returned normal came pointing upwards. When selecting this mode the Generate Edges progress bar will appear, and the edges of the models in the scene will appear.
3. **Pick Edge Loop**: this picking mode is useful for selecting the center of a loop. Upon selecting this mode the models’ edges will be generated. If two loops are close to the selected point, both of them will be highlighted one with green, and the other with red. Two loop icons will appear on the upper right side of the 3D area, for the user to select the loop he wants. In the left image below, to get the center of the gear, select the red loop icon. After selecting the red loop icon, the normal at the center of the gear will be displayed, as shown in the right image. This can be helpful in picking the center of rotation in a Wheel animation, for example.

4. **Pick Center Of Curvature**: with this picking mode picking a curve will highlight the curve, and will display its center normal, as shown in the image below.
View Mode

The default view mode in Ashlar-Vellum Kinetics is the **Solid View**. It displays models in solid view with edges hidden. The user can select one of the following view modes in Ashlar-Vellum Kinetics.

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
<th>Short Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>![X Ray View Icon]</td>
<td>X Ray View</td>
<td>Alt + 1</td>
</tr>
<tr>
<td>![Edge Only View Icon]</td>
<td>Edge Only View</td>
<td>Alt + 2</td>
</tr>
<tr>
<td>![Solid Illustration View Icon]</td>
<td>Solid Illustration View</td>
<td>Alt + 3</td>
</tr>
<tr>
<td>![Solid View Icon]</td>
<td>Solid View</td>
<td>Alt + 4</td>
</tr>
<tr>
<td>![Real Time Icon]</td>
<td>Real Time</td>
<td>F4</td>
</tr>
</tbody>
</table>

1. **XRay View**, gives an x-ray effect to the models in the scene.
2. **Edges Only View**, displays only the edges of the models, in the scene.
3. **Solid Illustration View**, displays models in solid view, with their edges illustrated.
4. **Solid View**, displays models in shaded solid view.
5. **Real Time**, starts real time rendering for the 3D models in the scene

Undo / Redo

These two function buttons will undo/redo performed action in Ashlar-Vellum Kinetics respectively.

Default Behavior

This function sets Ashlar-Vellum Kinetics to default behavior in, which is described in the following table.

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Mouse Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan</td>
<td>Middle mouse button</td>
</tr>
<tr>
<td>Rotate</td>
<td>Left mouse button</td>
</tr>
<tr>
<td>Zoom</td>
<td>Right mouse button</td>
</tr>
</tbody>
</table>
Camera Pan

This function changes the behavior of the left mouse button, to Pan.

Camera Zoom

This function changes the behavior of the left mouse button, to Zoom.

Library / Timeline panel

This panel will display a different library, depending on the selected workbench / task combination. For example at the Scene Building workbench, the Materials library will be shown by default. If the user selects the Object task, at the same workbench, the Basic Shapes library will be displayed instead. In the Animation workbench the timeline will be displayed instead.

In any library the user will have three buttons, as shown in the material library image below.

Add New

Clicking this button will add a new item to the corresponding library. In the Basic Shapes library, for example, clicking this button will display the Add New Item dialog. The user can input the name for the new item, and can choose to render its preview image.
Delete
This button will delete the selected item from the library.

Manage Library
Clicking this button will display the Manage Library dialog, where the user can add new library(s), rename or delete existing ones.

The Manage Material Libraries dialog has more options. Ashlar-Vellum Kinetics, by default, comes with Kinetics materials library that has different groups/materials types. In this dialog the user can export, import, or merge different material libraries. Material libraries will be exported in (*.mlb) file format, and the packed libraries to import should have the same file extension.
Properties panel

When geometry is selected in the 3D area, in any workbench, this panel will display four tabs describing the selected geometry. The user can change the properties in this panel.

Object Tab

In this tab the user can change the selected object Name property. Other object properties that can be set in this tab include:

**Hide/Show**: by clicking this icon the user can hide/show the selected object in the 3D area. These two functions are available in the Object tab of the Scene Building workbench.
**Freeze/UnFreeze:** freezing the selected object will lock its position/orientation in the 3D area. All transformation functions will NOT be applicable to it, until this icon is clicked again to unfreeze it. These two functions are available in the Object tab of the Scene Building workbench.

**Apply Actions:** in this combo box, the user can select any of Kinetics actions to apply to the selected object. Applied actions can be exported to 3D PDF files, as well as HTML (Web GL).

**Kinetics Actions**
Ashlar-Vellum Kinetics supports a number of predefined Actions that can be executed upon clicking a 3D model, or clicking Templates’ elements. Advanced users can write their own script to define new actions. Kinetics actions can be executed in 3D PDF, and HTML files.

<table>
<thead>
<tr>
<th>Action</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>URL</strong></td>
<td>Links 3D geometry OR Template element with the entered web address, that will be opened On Click.</td>
</tr>
<tr>
<td><strong>Message Box</strong></td>
<td>Displays a message box upon clicking 3D geometry OR Template element. The user needs to enter the Message and its Title.</td>
</tr>
<tr>
<td><strong>Animation Play</strong></td>
<td>Plays scene’s animation upon clicking 3D geometry OR Template element. One animation is supported for a scene.</td>
</tr>
<tr>
<td><strong>Animation Stop</strong></td>
<td>Stops playing scene’s animation upon clicking 3D geometry OR Template element.</td>
</tr>
<tr>
<td><strong>Script</strong></td>
<td>Enables users to write their own script to be executed upon clicking 3D geometry OR Template element.</td>
</tr>
<tr>
<td><strong>Scene State</strong></td>
<td>Executes a scene state upon clicking 3D geometry OR Template element. Scene states can be selected by Name or Index.</td>
</tr>
<tr>
<td><strong>Multi Actions</strong></td>
<td>Executes a number of actions upon clicking 3D geometry OR Template element.</td>
</tr>
</tbody>
</table>
Multi Actions Option

If the Multi Actions option is selected, clicking the Actions List button will open the Multi Actions List dialog. By clicking the ‘+’ button the user can enter a list of actions of different types. The order of these actions can also be changed using the up and down arrows. These actions will be executed upon clicking the selected 3D geometry, and they can also be applied in 3D PDF templates. Supported ways of applying the actions list are:

Loop; runs the actions’ list upon click in order, then from start again. That is action_1, 2, 3 ..., then 1, 2, 3.

Swing; runs the actions’ list upon click in order, then backwards again. That is action_1, 2, 3 ..., then 3, 2, 1.

Random; runs the actions’ list upon click randomly.

Run All; runs the actions’ list upon click in order one time.

Transform Tab

In this tab the location of the selected object and its pivot can be known, as well as changed with precise values. Also Scaling uniform/non-uniform can be done for the object around its center. Both the Object and its pivot have Global, and Local locations/orientations. The Global location is the location of the object’s center relative to the world’s coordinate system. The Local location changes according to the transforms performed on the object, relative to its parent.
Attributes Tab
In this tab the user can define attributes attached to the selected geometry in the 3D scene. These attributes can be exported to 3D PDF files, when the ‘Export Object Attributes’ option in the Advanced tab of PDF Settings dialog is checked. This can help designers communicate BIM and meta data.

Material Tab
In this tab the user can change the Name and Type of the material for the selected geometry. Ashlar-Vellum Kinetics supports different material types. Common properties between different types of materials are grouped in a common place in the Properties panel.

Different types of maps can be also applied to the material of the selected geometry, in this tab. These maps can have different effects on the look of the 3D model, thus reducing the needed modeling time and complexity. Each map has its own parameters that can be accessed by clicking the downwards arrow under the map’s image file. The user can add a map to a material by clicking the ‘+’ image, a material can also be deleted by clicking the ‘x’ button under the material image.

Texture Maps can be applied to any material type. The user can select to apply a texture file, and then fine tune the different parameters to get the required effect.
**Bump Maps** are used to simulate the look of geometric details on objects, so it helps the user avoid the inefficiencies when modeling these details in the geometry itself. Bump maps can be set to a texture of any format. Notice that even when a colored image is supported, it is still utilized as if it is in gray scale since bump map utilizes the intensity and not the color of the pixels.

The bump map basically simulates the effect of changing the surface level of the object, where bright pixels in the bump map image simulate heightened areas, and dark pixels represent lowered areas.

On top of the regular texture, scale, and offset properties, the bump map has one additional parameter, Strength which can be set to any positive value, and gives the user the ability to modify the bump effect where higher values make the effect stronger and more pronounced and therefore cause object to appear less smooth.

**Normal Maps** are similar to bump map, used to simulate the look of geometric details on a 3d object. The difference is that in the case of bump map, a gray scale image maps the height of the surface, whereas in the normal map a colored (RGB) image is used to map the direction of the normal in addition to its height. As such, a normal map enables finer control, but requires three channels (R,G, and B) to perform normal calculations.

Normal maps are generally generated by specialized software, which should give an RGB normal map image according to the desired effect by the user, in addition, lots of usable normal maps can be found on the net.

**Opacity Maps** give the user the ability to specify holes, transparent areas, and opaque areas on the mapped object. The image itself contains the opacity data in the following way:

- Black pixels in the image map represent holes
- Gray pixels represent semi-transparent areas (as brightness increases, opacity increases)
- White pixels represent opaque areas

In the image shown below, opacity maps, where applied to the bird-house on the left. These maps gave the effect of having a house door and top windows without having to do any more modeling than what was done on the right model.
1 Settings / Help bar

In this part of Ashlar-Vellum Kinetics interface, the user has access to application settings, register, help and more.
Preferences

The user can change setting in each created scene, separately. In other cases it would be easier to set the common settings to be used when creating new scenes. This can be done in the Preferences dialog. This dialog has four tabs, described below;

Directories tab

In this tab the user can change the default directory(s) for Textures, Material libraries, Object libraries, and Templates used for exporting to 3D PDF, HTML/Web GL, and iPad/Android.

Advanced users may select to move the User Data directory to a new location; the user should copy the original data to the new location before setting the new User Data folder.

Camera tab

Keep Above Ground; if checked the camera rotation will stop at the ground level, and won’t go below. This option is applicable to Parallel and Perspective cameras.

Background Color; is the color of the scene’s background in Ashlar-Vellum Kinetics. To display the selected background color, in Ashlar-Vellum Kinetics, check Preview Background in the Background Settings, under the Render menu, and uncheck the Preview Environment.
Import/Export tab

Automatically transform imported models; when checked, the first imported model will be automatically transformed/scaled by the value entered in the ‘First model size to world size’ text box, to the largest dimension of the world size of that scene. The model will be placed in the center of the world.

The same transform/scale will be applied to all imported models in that scene.

Tessellation: This parameter controls the number of triangles to be generated when importing a 3D model that needs tessellation; the following file formats require tessellation: STEP, IGES, and ACIS.

Polylines Geometry; in this group the user can select to import measurement and text annotations created in the design CAD package. Importing polylines can also be checked, and the width of the imported lines can be specified. In the image shown to the right, the same model was imported twice, with import measurements and polylines options checked. The first time Line Width was set to 1.5, and then to 5.0 in the second. As can be seen in the image the trees branches are wider in the second time.

Export Units; are units to be used when exporting 3D models from Ashlar-Vellum Kinetics. By default Ashlar-Vellum Kinetics uses meter units, and the user has the option to select different units. All numbers will be converted to the selected unit to maintain the correct size of the exported object.

FBX group; in this group the user can select the behavior when importing FBX files, and is only available in Ashlar-Vellum Kinetics Animation Edition.

Import FBX transform animation option will import the rigid body animation included in the FBX file.
Import FBX advanced animation option will import skinning animation to Ashlar-Vellum Kinetics Animation Edition. Ashlar-Vellum Kinetics does not have the ability to modify this type of animation; it can import it for rendering an animated 3D scene.

Support exporting instances in 3DS; this option will detect instances included in the scene when exporting a 3DS file, thus will reduce the size of the generated 3DS file. Still this option is not supported in all applications reading 3DS files.

Automatically generate texture coordinates; texture coordinates for the imported geometry will be automatically generated when this option is checked.

**Appearance tab**

In this tab the user can set the preferred appearance options for Ashlar-Vellum Kinetics, including:

Language; this option allows the user to select the language to be used in Ashlar-Vellum Kinetics from the supported languages combo box. Changing the language takes effect after restarting Ashlar-Vellum Kinetics.

Style group; enables the user to select between two available styles, for Ashlar-Vellum Kinetics’s interface. Changing the interface will take effect after restarting the application.

Fixed View group; if the view mode in the Common toolbar is set to Fixed Size, the values for the Width/Height entered in this group will determine the size of the 3D area.

Preview Images group; these preview images are the ones used in the Basic tree. Thus if the Generate preview images option is unchecked, no images will be generated. A basic 3D Geom image will be displayed instead. If it is checked the user can set Max generation time, which is the max time in seconds spent in generating preview images for the selected geometry, all the way up to its top assembly. The cashing for these generated images will be kept, thus if the maximum
generation time was not enough to generate all images the first time the geometry was selected, they can be generated the next time.

Mini Mode is always on top; this option when checked will display the mini mode of Ashlar-Vellum Kinetics on top of any other application. This can be helpful in using Ashlar-Vellum Kinetics as a plugin with other 3D CAD applications.
Switch to Mini Mode

Clicking this option will display Ashlar-Vellum Kinetics in mini mode. This mode allows the user to use Ashlar-Vellum Kinetics actively, while using the 3D design application. The mini mode is equipped with the commonly used functions, shown in the image below.

Dock/Undock all widgets

This function will dock/undock all widgets in Ashlar-Vellum Kinetics interface. This will allow the user with multiple screens to set the Kinetics widgets on one screen, and use the other for Ashlar-Vellum Kinetics thus increasing the size of the 3D area.
Register

Clicking this option will display the License Dialog, where the user can manage the Kinetics license. The user can buy professional licenses, or get free trials. For more information about requesting/activating a license go to http://www.ashlar.com

Help

Under the Help menu the user has access to different help documents, including;

- This Kinetics help document
- Kinetics RT Renderer help document
- Kinetics Designer help document
- Kinetics Scripting help document
Quick Access tabs

Include functions that the user might need quick access to, without having to change the workbench, in Ashlar-Vellum Kinetics. Currently this part includes two tabs, the Animation tab from the Animation application, and Scene States tab from Scene Building application.

Animation tab

This tab includes a packed version from the Animation application Time Line. So the user can play the animation in the scene at any given workbench.

Scene States tab

This tab gives the user access to the main function necessary to capture Scene States, at any given workbench. The user can check the properties to include in the Scene State. Scene States can also be captured for the whole scene, or from selection, in this tab. At any given point the user can click the Go to Scene States tab, which will take him to that tab in the Scene Building workbench.
Massages area

Some functions in Ashlar-Vellum Kinetics require the user to make some kind of action/selection. In this area of the application interface massages can be displayed to inform the user about the required action.

Current Action area

This area will display the last captured Scene State, in case of Scene States creation. In case of using any of the draggers in the Move task, a spin box will be displayed in this area. The user can input values in this box, or use its spin arrows.
Scene Building workbench

This workbench is equipped with all the tools needed to build 3D scenes in Ashlar-Vellum Kinetics. Upon selecting this workbench the workbench task bar will show the following tasks:

File task

In this task bar the user can create new scenes, open created ones, and more.

New / Open

Upon starting Ashlar-Vellum Kinetics, or clicking this new button, the New Scene dialog will appear. In this dialog the user can select to create a 2D ground scene, open a scene, or create an empty one. Images for the last opened scenes are displayed in this dialog for quick access. This last files list is also accessible from the arrow beside the Open icon.

Clicking the Open Scene icon button in this dialog, or the Open icon in the File task bar, will display the Open Kinetics file dialog. In this dialog the user can open already created *.sim files. After selecting the scene type an informative window will appear, describing the new interface for the
user. It indicates the need to select the workbench to work with first, and then the task. The user can check the **Do not show again** option to stop this window from appearing.

**Save / Save As**

Both function buttons will open the Save Kinetics file dialog, where the user can select the name and location for the created *.sim file.
Pack

This function button displays Pack the Scene dialog, in which the user can create *.zip file based on the selected file format from the list.

![Pack the scene dialog]

The packed *.zip file will include all 3D models in the scene, along with their materials, and textures. HDR files and BackPlates can also be included, if the user checks this option. Packing a scene is necessary for the user to share 3D scenes created in Ashlar-Vellum Kinetics with others.

Import / Export

Both function buttons will open the corresponding Import/Export Geometry dialog. The import function enables the user to build scenes filled with 3D models form different file formats. The export function, on the other hand, enables the user to share the created 3D scene with others in different formats.

Clicking Import will display the Import Geometry dialog, where the user can browse to the 3D geometry to import. Upon selecting a 3D file, the Import File dialog will appear. In this dialog the user can set different options for 3D import, including:

- Up vector; Z axis is selected by default. The user can choose a different access depending on the design of the imported 3D geometry.
- Scale and center; this option when checked will scale the imported geometry to fit into the 3D scene. It will also import it to the center of the scene.
Zoom to imported model; this option when checked will zoom the camera to the imported geometry. The keep dynamic link option is as described below. The user can check the ‘Do not show again for this file type’ option, to stop this dialog from appearing upon importing this file format.

Keep dynamic link

This option in Ashlar-Vellum Kinetics import function improves working with 3D design applications. It enables users to keep dynamic link/automatic update between the 3D model design application and Ashlar-Vellum Kinetics, when the ‘Keep dynamic link’ option is checked in the import dialog.

In the images shown below the house designed in Google SketchUp was imported into Ashlar-Vellum Kinetics, with the dynamic link checked. Different materials and texture were applied to the house model, in Ashlar-Vellum Kinetics and real time rendering was started.
Ashlar-Vellum Kinetics

In SketchUp the model has been changed/saved, where the garage area was made bigger. To keep the dynamic link, Ashlar-Vellum Kinetics issues a massage informing the user about the model’s design change.

In this dialog the user can save the model in Ashlar-Vellum Kinetics with the old design. Then clicking Update, with the Retain scene materials option checked, will update the design model while keeping Ashlar-Vellum Kinetics materials and textures.
Supported import formats

Ashlar-Vellum Kinetics supports importing the following industry standards CAD/3D file formats.

<table>
<thead>
<tr>
<th>File Format</th>
<th>Source Package</th>
<th>Ashlar-Vellum Kinetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>xaml</td>
<td>Standard format</td>
<td>✓</td>
</tr>
<tr>
<td>3dxml</td>
<td>CATIA</td>
<td>✓</td>
</tr>
<tr>
<td>skp</td>
<td>SketchUp (up to ver 2014)</td>
<td>✓</td>
</tr>
<tr>
<td>3dm</td>
<td>Rhino (up to ver 5)</td>
<td>✓</td>
</tr>
<tr>
<td>sldprt, sldasm</td>
<td>SolidWorks (up to ver 2014)</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>sat</td>
<td>ACIS</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>STEP</td>
<td>Standard CAD format</td>
<td>✓</td>
</tr>
<tr>
<td>IGES</td>
<td>Standard CAD format</td>
<td>✓</td>
</tr>
<tr>
<td>U3D</td>
<td>Standard format</td>
<td>✓</td>
</tr>
<tr>
<td>3D PDF</td>
<td>Adobe Acrobat (U3D Based)</td>
<td>✓</td>
</tr>
<tr>
<td>DAE</td>
<td>Collada (Standard format)</td>
<td>✓</td>
</tr>
<tr>
<td>FBX</td>
<td>(up to ver 2014.1)</td>
<td>✓</td>
</tr>
<tr>
<td>3DS</td>
<td>3DS</td>
<td>✓</td>
</tr>
<tr>
<td>OBJ</td>
<td>Wavefront</td>
<td>✓</td>
</tr>
<tr>
<td>STL</td>
<td>Stereolithography</td>
<td>✓</td>
</tr>
<tr>
<td>DWG</td>
<td>AutoCAD (Up to 2015)</td>
<td>✓</td>
</tr>
<tr>
<td>DWF/DWFX</td>
<td>Autodesk Standard</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>DXF</td>
<td>AutoCAD</td>
<td>✓</td>
</tr>
<tr>
<td>OSG</td>
<td>Open Scene Graph</td>
<td>✓</td>
</tr>
<tr>
<td>ipt, iam</td>
<td>Autodesk Inventor (up to 2015)</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>X_T, X_P</td>
<td>Parasolid</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>IFC</td>
<td>IFC</td>
<td>✓</td>
</tr>
<tr>
<td>par, asm, psm</td>
<td>Solid Edge (up to ST6)</td>
<td>✓ (Windows only)</td>
</tr>
<tr>
<td>Zim</td>
<td>Kinetics Archive</td>
<td>✓</td>
</tr>
</tbody>
</table>
Supported export formats

3D Scenes built using Ashlar-Vellum Kinetics can be exported in the following file formats.

<table>
<thead>
<tr>
<th>Export File Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D PDF (*.pdf)</td>
</tr>
<tr>
<td>HTML 5 (*.html)</td>
</tr>
<tr>
<td>osg (*.osg)</td>
</tr>
<tr>
<td>osgb (*.osgb)</td>
</tr>
<tr>
<td>ive (*.ive)</td>
</tr>
<tr>
<td>obj (*.obj)</td>
</tr>
<tr>
<td>DWF (*.dwf, *.dwfx)</td>
</tr>
<tr>
<td>DWG (*.dwg)</td>
</tr>
<tr>
<td>DXF (*.dxf)</td>
</tr>
<tr>
<td>SketchUp (*.skp)</td>
</tr>
<tr>
<td>3DS(*.3ds)</td>
</tr>
<tr>
<td>U3D (*.u3d)</td>
</tr>
<tr>
<td>KeyShot (*.bip)</td>
</tr>
<tr>
<td>Collada (*.dae)</td>
</tr>
<tr>
<td>FBX (*.fbx)</td>
</tr>
<tr>
<td>DirectX (*.x)</td>
</tr>
<tr>
<td>Indigo (*.igs)</td>
</tr>
<tr>
<td>STL (*.stl)</td>
</tr>
</tbody>
</table>
Object task

Upon selecting this task, the workbench task bar will show the functions for creating duplicates for 3D objects, as well as hide/show objects, and freezing capabilities.

The library panel, on the other hand, will change to show the Basic Shapes, object library. This library provides users with quick access to frequently used 3D models. In this panel the user can add new items to the Basic Shapes group, and can delete others. Clicking the Manage Library button, enables the user to create new groups and manage existing ones.
Copy

Ashlar-Vellum Kinetics supports the creation of multiple duplicates of an object. This can be done either by creating a copy, or an instance of that object.

Create Copy, creates a copy of the selected object, together with a copy of all the materials and transforms it uses. Each of the two copies will have its own materials, and transformations. Thus changes to the materials’ properties of one can be done without affecting the properties of the other. Different transformations can be applied to each without affecting the other.

Make Instance, creates an instance of the selected object, with the same materials’ structure and transforms as the original object. Thus changing the materials’ properties will be applied to both objects. Also transformations applied to either one of the instances will be applied to the other.

Hide/Show

These two functions can be used to hide/show selected geometry in the 3D scene.

Freeze/Unfreeze

These two functions can be used to freeze/unfreeze selected geometry in the 3D scene.
Move task

In this tab all functions necessary for positioning geometry in a 3D scene can be found.

Transform

When the user clicks any dragger in this task bar, a small scroll combo box will appear, at the current action area, at the top right corner of the 3D area. The user can use this box to input exact numbers for translation/rotation/scale or can just scroll up and down. If the user prefers to freely drag the 3D geometry, this can be done using the dragger in the 3D area. Different draggers are described in the table below.

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
<th>Short Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Empty" /></td>
<td>Empty the selection</td>
<td>Esc</td>
</tr>
<tr>
<td><img src="image" alt="Move 2D" /></td>
<td>Move 2D, allows moving the geometry in the X and Y directions, and rotating around the up vector (Z axis)</td>
<td>1</td>
</tr>
<tr>
<td><img src="image" alt="Move 3D" /></td>
<td>Move 3D, allows movement in all three directions, and rotation around all three axes</td>
<td>2</td>
</tr>
<tr>
<td><img src="image" alt="Uniform Scale" /></td>
<td>Uniform Scale, used to scale geometry uniformly</td>
<td>3</td>
</tr>
</tbody>
</table>

Pivot

The pivot of a 3D geometry is the point around which transforms applied to the geometry will be done.

Show

This function shows the pivot for the selected 3D geometry in the 3D area, with draggers. These draggers allow the user to move and rotate the pivot in any direction.
Move
This function allows the user to snap the pivot point to another point location. The user can make use of the Pick Mode options described in the Common Toolbar, to help in selecting an exact point. After selecting the point the user can either click the Approve or Decline icons in the upper left corner of the 3D area.

Center
This function requires the user to select two points, and the pivot of the 3D geometry will be snapped to the center between them. Again the user can make use of the Pick Mode options described in the Common Toolbar, to help in selecting exact points.

Snap
The snap functions are used for aligning 3D objects.

Snap to Ground; snaps the selected object(s) to the ground.

Snap To Object; displays a massage in the Massages area, at the top left corner of the 3D area, asking the user to select the object to snap to.

Align; function can be used with Ashlar-Vellum Kinetics picking modes, in the Common toolbar, to align selected geometry(s) along selected axes.
Align Example

In the images shown below, we need to align different parts to the main cylinder of the gripper. Change the View mode to Solid Illustration, to benefit from Ashlar-Vellum Kinetics picking modes. This will generate edges for different parts in the scene. Pick the part(s) to move and then click the Align Objects tool. A massage will appear in the Massage area, indicating the need to pick first alignment point. Choose **Pick Center Of Curvature** from the Pick mode in the Common toolbar, and select the circumference of the inside cylinder.

The massage will change to pick the second alignment point, so pick the outer circumference of the main cylinder, with the same pick mode.
The cylinders will be aligned, with two directional options, in the upper right corner of the 3D area. Click the reverse direction in this case.
Repeat the same steps with the other sub-assemblies, to align all the parts.
Material task

In the Scene Building workbench, the user needs to be able to apply materials for different objects in the 3D scene. Material task bar includes all the functions needed for material application, and materials management.

Show Materials

This function button will display the Scene Materials dialog, which includes the material functions shown in the image below. Some of these functions are included the Material task bar, others are found only in this dialog.
Delete Material

This function deletes the selected material, from the Scene Materials dialog. In case the material is being used by objects in the scene, a dialog will appear asking the user to select a replacement material before the deletion.

Select Objects Using Material

This function selects all objects, in the scene using the selected material in the Scene Materials dialog. These objects-geometry will be highlighted in the Object Tree, and in the 3D area.

Apply Material To Selected Objects

To use this function the user should select object(s) first, then select a material from the Scene Materials dialog or the from the Material library. After that he can click this function button and the selected material will be applied to the selected objects.

Merge Identical Materials

In cases where more than one object in the 3D scene is using the same material, Different copies of that material will appear in the Scene Materials window. This function cleans the materials dialog from unnecessary duplicates.

Change View

This display option is available for the user to change the way the materials are displayed, in the Scene Materials dialog. They can be displayed in Large, or Small icons, or can be shown as a list.

Sort By Name/Sort By Attributes

Two options for sorting the Scene Materials are available for the user.

Add New Material

This function creates a new default material-type, and adds it to the Scene Materials dialog. The new material with all of its properties will be shown in the Properties panel of the application Interface.

Delete Unused Materials

Deletes all materials not referenced by any object in the scene. This function is also found in the Scene Materials dialog.
Save as library

After applying all materials for all geometry in a 3D scene, clicking this function will display the New Material Library window. In this window the user can input a name for the new library then click Ok. This will save the applied scene materials in a library, and it will be shown in the Current Library combo-box, and in the Manage Material Libraries panel.

Retain from library

Before clicking this function button the user should first select the library to use, in the Current Library combo-box. This function will reapply materials included in the selected library to the different geometry based on previously assigned materials names.
Camera task

This bar includes all necessary function for creating, aligning, and setting the different cameras in a 3D scene. Selecting this task has no effect on the library panel; this gives the user the option of setting the needed library. Created cameras can be optionally exported to 3D PDF, and HTML files.

New Camera

Clicking this function creates a new camera in the 3D scene, and adds it to the object-tree. The user can change the view of the created camera, in different ways:

- Using any of the Move tools, in the Move task bar.
- Linking the camera to a view in the 3D area, either by dragging the camera onto the view or using the Connect function. Then changing the orientation of this view will be saved in the linked camera.
- Selecting a camera in the 3D scene, will display its properties in the Properties panel. Adjusting the Position parameter in this dialog will change the camera location, and its view.
Snap Shot

This function creates a scene state of the current camera. This scene state will be shown in the Current Action area, as well as in the Library Panel of the Scene States task. Since this scene state is a camera state, it will be added to the All and Camera tabs, of the Scene States library.
Pick
This function sets Target Vertex, for the active-view camera. It will display a massage in the massage area, asking the user to select the vertex to use as the world center. Selecting a point, on any geometry in the scene, will change the world center to that selected point. Zooming and rotating will be relative to this point.

Object
This function changes the world center to the center of the selected geometry. If the user clicks this button without selecting any geometry(s), a warning massage will appear asking for object selection.

Show
Clicking this button will display a pivot icon with three axis’s representing the camera center, as shown in the image below. This is helpful for predicting the axis of rotation, especially when exporting into a 3D PDF file.
Connect/Disconnect

This function can be used as another way for connecting cameras to views. The first way is by dragging a camera and dropping it onto a view. If the scene includes a single camera, clicking this function will connect that camera to the active view. If the scene includes more than one camera, the Select Camera dialog will appear with a list of the available cameras to select the one to connect.

The Disconnect function, on the other hand, will disconnect any camera linked to the active view. If no cameras are linked to the active view no action will be done.
Isolate/Unisolate

In complex scenes, this tool can help the user focus on a specific geometry. In the image shown below, a complex crowded engine is under construction. Selecting one of its gears, and clicking the Isolate icon, will hide all other geometry in the scene and will let the user focus on the selected gear.

![Image showing complex engine being constructed.]

After finishing the work with the isolated geometry, clicking the Unisolate icon now will show the rest of the scene.

Capture Image

Clicking this function button will open the Save Image window, allowing the user to save an image for the active view from the opened scene. The user can browse to the file location, and save the image in (*.png) or (*.jpg) file formats.

Spin/Free

By default the navigation mode in Ashlar-Vellum Kinetics is free rotation. Selecting Spin changes the navigation mode to spin the world axis.

Select Active Camera

This function selects the camera linked to the active view, and displays its properties in the Properties panel.
Light task

This task bar has the supported light types in Ashlar-Vellum Kinetics, which are suitable for interior and exterior scenes. Users can add any of these light sources in addition to the light sources included in the environment image. Light sources in Ashlar-Vellum Kinetics - except for the Camera Head Light- are exported to 3D PDF and HTML.

When a *.sim file is created or opened the Camera Head Light will be on, to give the user a clear view of the scene. This light will not be exported to 3D PDF or HTML files; it is only for viewing purposes. In the left image below the Camera Head light is on, while it is off in the right image.
**Point light**

Selecting this light type will create a spherical Light Source geometry and add it to the scene. Point lights can be moved and positioned, using any of the move draggers. In the image below three point lights were added to the scene, and were snapped to the side lamps’ geometries using the **Snap To Object** tool in the **Object task** bar. Fine positioning was also done using the Move 3D tool. The light properties can be found in the Properties panel, to the right of the 3D area. There the user can edit a light’s properties, like changing its color, or its power.
Area light

Depending on the effect the user needs, this is another light type that can be used. As shown in the image below the same scene is now lit using an area light.

Like Point lights, area lights have parameters that the user can change in the Properties panel.

Spot light

Spot Light is another light type that can be created in Ashlar-Vellum Kinetics. In addition to the main light properties, spot lights have Cone Angle property that sets the angle of the light. In the images bellow the cone angle was set to 30 in the first image and 60 in the second one.


**Directional light**

Directional lights are for exterior scenes. The user can change the direction of the light but not its location. Other parameters for this light include, light Color, Power, and Name.
Create task

This task bar provides the user with the ability to create different Scene elements that can add value to a 3D scene.

Decal

Applying a company Logo, or product images to 3D models is made easier with create Decal. Clicking this function will open the Decal window. The parameters in this window are:

Image: requires setting a valid path for a valid image file.

Rotation: is the rotation angle, in degrees, to be applied to the decal image.

Scale: is a uniform scale value to be applied to the decal image.

Depth Factor: is the depth value for applying another image of the decal, in case of applying the decal on more than one geometry.

After selecting an image, the user needs to pick four points, and a center to set the image location.

To learn more about decal creation, check Ashlar-Vellum Kinetics tutorials at:

3D Text

Clicking this function will open Create Text3D dialog, where a user can type in text, and select its format. Clicking the OK button will create 3D text parallel to the ground in the 3D scene. An assembly with geometry for all letters in the text will be added to the Object Tree. Different
transforms can be applied to the text. A user can also change the material of the generated 3D Text, by dragging material form the materials library, and dropping it on its geometry in the Object Tree.

To modify anything in the created 3D text, select the text in the 3D area, or in the Object Tree, to display its properties in the Properties Panel.
Section Plane

Creating a section plane can be helpful to show the interior of 3D model(s). Clicking this function button will create a section plane and add it to the Object Tree. The newly created section plane will be selected in the 3D area with the 3D dragger to enable the user to transform/rotate the section plane.

Section plane effects are exported to the generated 3D PDF files, rendered images, and exported file formats such as OBJ.

By default a section plane cuts through the whole scene. Using the Break Using Sction Plane tool, the user can select the geometry to cut using section plane(s).

In the image shown below a scene with three spheres inside each other, and three section planes were created with different orientations. Select each section plane and use it to cut through the outside and the middle spheres. To do that go to Geometry task and with the sphere to cut being selected, click the Break By Plane function button. This will break the geometry into two in the object tree and the 3D area. Repeating this for all three section planes will split each sphere into eight parts. Deleting / hiding some of the parts will result in the shown image.
Path

Different paths can be created in the Path group. The user can create Open, Closed, or Circular paths. To activate a path, the user can select it from the Object Tree. Paths can be used to create Path Animation. Upon clicking any path function, a massage will appear in the Massage area, asking the user to start picking the path points. Approve and decline icons will appear at the top left corner of the 3D area, to end selection.
Geometry task

This task bar provides the user with geometry related tools.

Break Geometry

The smallest representation of geometry in Ashlar-Vellum Kinetics is 3D Geom. 3D Geom is a geometry that has one transform and one material applied to it. All contents of 3D Geom are moved together, and must have the same material.

Some model formats do not support saving Object Tree structure, when importing 3D models of those formats, 3D Geom can contain many none connected parts. The Break geometry tool enables the user to break a 3D Geom that contains none connected parts into multiple 3D Geoms. Each one of the new 3D Geoms can be moved separately and can be assigned a unique material.
In some cases when the whole model is connected, with no separated parts, it won’t be possible to break the geometry. In such cases, a message will appear indicating that, and suggesting the Break Faces tool.

**Break Faces**

This tool will break the selected 3D model into its faces. Each face will be converted to 3D Geom, and added to the Object Tree. Unique materials can be assigned to each face. In the above stool example, the top geometry with a different material was broken into its faces as shown in the image below. Different materials were applied to the different generated faces.
Break By Plane
This tool enables the user to select the geometry to cut through using a section plane already created in the scene, using Create Section Plane from the Create task bar. Using the same section plane with different orientations, different cuts can be done on the geometry.

Break Instances
Instances in Ashlar-Vellum Kinetics are multiple duplicates of an object using the same materials’ structure, and same transforms as the original object. Using this function the instances can be broken, thus each one can have its own materials/transforms.

Explode / UnExplode
Explode function makes it easy to show the components of an assembly. When selected the explode geometry dragger will appear, allowing the user to explode the selected object(s) in the X, Y, and Z directions. The user can also rotate the dragger to select an arbitrary vector to be used for exploding the assembly.
The user should click either the Approve or the Decline mark in the upper left part of the screen, when done with exploding the geometry. Clicking the red Decline mark will cancel the operation of creating the exploded view. After completing the explode operation the user can go back to the original model by clicking UnExplode.

Merge on Material

With an assembly selected in a 3D scene, selecting this tool will merge geometry using the same material into a single geometry. In the image shown to the left, the three selected geometry in the car model are using the same material. In the right image the Merge

Smooth Normals

For non-smooth 3D models with lots of polygons, this tool can be used to smooth the model for rendering and other 3D sharing options.
Combine Vertices

Vertices having the same texture material and normal direction will be replaced by a single vertex, using this tool. This will reduce the size and complexity of a 3D model.

Info

Clicking this tool will display Geometrical Info dialog, showing the number of Objects, Vertices, and Polygons in the selected geometry. Knowing the number of vertexes and polygons can help a user estimate the size of the output file. This might make the user ignore some details, for sharing efficiency.

Voxelize task

Voxlizing a 3D model is rebuilding the 3D model using building bolcks (voxels), like LEGO. The user can choose the building block to use for voxelization, and can choose to voxilize the whole scene, or the selected geometry. Notice that this will add a significant number of polygons to your 3D scene.

The Voxelize Options dialog will appear, when clicking any of the voxelization options. The default voxel object is a cube of certain size, and the user can choose a different object, by clicking the Pick voxel option. The voxel object needs to be a geometry in the scene, and the user can just pick it.

The Combine voxels based on material option, if checked, will combine all voxels, based on material, each in one geometry in the Object Tree. If not checked each voxel will have its own geometry in the Object Tree.
**Texture Coordinates task**

Texturing is the process of applying an image to a 3D object, to give it a more realistic look. Texture Coordinate task bar gives the user different options to define the way the image is applied to an object.

Ashlar-Vellum Kinetics can be used to generate and update texture coordinates on 3D objects. Ashlar-Vellum Kinetics supports four types for generating texture coordinate.

- **Plane:** This type treats the selected geometry as a plane when performing the texture coordinates generation. So it can be used to generate texture coordinates on a ground, on a picture frame, or on a computer screen.
- **Box:** This type is suitable for geometries better represented by a box. It has a Caped property option enabled.
- **Sphere:** this type treats the geometry as a sphere.
- **Cylinder:** This type has the Caped option as the Box type.

The object to generate texture coordinates on should have a material in the Scene Materials with a texture map, applied in the Properties Panel. With the object selected click the generation type, change the properties, and then click Run to generate the coordinates.

The properties to manipulate texture coordinates are:

- **U Scale** and **V Scale:** are scaling factors in the u, and v directions. A user can scale the texture either by widening it, giving scale values greater than one, or shrinking it, giving scale values less than one.
- **U Offset** and **V Offset:** shifts the texture in either direction by the value entered.
- **Rotation:** rotates the texture by an angle, in degrees, entered in this field.
- **Caped:** this option property is available in the box and cylinder types. It gives the user the option to better represent the object the texture coordinates are being generated on.
• **Group:** this option can be checked when a textured material needs to be applied on more than one geometry as a whole. This is useful for example when generating box texture coordinates on a number of faces.

After selecting the type of texture generation, and setting its properties the user needs to click Run to generate the texture coordinates.

**Scene States task**

Scene States enable users to capture different configurations for the selected 3D model(s), or for the whole scene. The User can check the properties to include in a scene state, from the Default Apply group in the task bar. Ashlar-Vellum Kinetics’s Scene States are smart in capturing attributes; they can include any combination of the listed attributes. This can be helpful in creating scene states for models with different attributes, and setups. If the user needs to show different products with different materials or versions, Kinetics smart scene states are the answer.

The user can also set the width and height for the scene state preview Image, to match the settings in the export template.

With the properties checked, the user needs to click the Capture option, to be either From Scene or From Selection. The first option will capture a scene state for the whole scene with the properties checked in the Default Apply group. The From Selection capture option captures a scene state for the selected model(s), with the checked properties. Depending on the checked properties, the generated scene state will be added to the corresponding tab(s) in the Scene States library.

In the image below, different scene states were created for the sink scene. The selected state have the Transform, Visibility, Light power, and Materials properties saved. Thus this scene state will be added to the four corresponding tabs in the Library panel, in addition to the All tab.
The Regenerate option will generate a rendered preview image for the selected scene state, with the size specified in the Preview Image group. The Regenerate All option, will generates rendered preview images for all the scene states.

Scene states have many useful applications including;
Rendering with Scene States

A user can create multiple scene states for a scene, to experiment with views, materials, lights, and prepare different configurations of a scene, etc. With Kinetics Smart Scene States, users have multiple options for creating scene states. With the Rendering workbench licensed, and in the ideal time of the machine, the user can click Render Scene States in the Render task. This will open the Manage Scene States dialog, where the user can select the scene states to render and their order. Clicking Ok will start rendering the selected scene states one after the other.
3D PDF generation with Scene States

With the Sharing workbench licensed, from the PDF tab, the user can create manuals showing products with different materials and configurations. In the image shown below the top shelves images were linked to scene states with Camera and Visibility properties included. The material images to the left were linked to scene states that stored Materials property only.

Before attempting to export a 3D PDF file, the user needs to select the template to use from the PDF Settings dialog. For more details about PDF export, and sharing go to Sharing workbench section of this help manual.
**HTML generation with Scene States**

With the Sharing workbench licensed, and from the WebGL tab, smart scene states created inside Ashlar-Vellum Kinetics can be exported into HTML. 3D sharing on the web is more efficient with smart scene states created for a 3D model. HTML Templates created in Kinetics Designer can be linked to scene states created in Ashlar-Vellum Kinetics, creating more interactive 3D experience.

**Scene States on iPad/Android**

With the Sharing workbench licensed, from the Android/iPad tab, sharing ideas with customers is evolving with smart scene states exported to Android/iPad. With a (*.sim) file created with Scene States, and iPad template created, scenes can be exported as *.zim files, viewable by Kinetics CA Viewer.

For more details about Android/iPad export, and sharing go to Sharing workbench section of this help manual.
Ashlar-Vellum Kinetics
Sharing workbench

Ashlar-Vellum Kinetics can be used as a sharing application. Users can share their 3D models and scenes with others in different methods that preserve models security.

PDF sharing task

3D Scenes created in Ashlar-Vellum Kinetics can be exported into custom designed 3D PDF files, using Kinetics Designer. The exported 3D PDF files can be opened using the free Acrobat reader (version 9.0 or newer), to take advantage of all the features in the generated 3D PDF file.
Features exported to 3D PDF files, as well as to HTML/WebGL files are listed in the table below.

<table>
<thead>
<tr>
<th>Exported Features</th>
<th>3D PDF Files</th>
<th>HTML 5 / WebGL Files</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D models &amp; geometry</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Textures</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Materials &amp; Colors</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Scene States</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Animations</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Kinetics Actions</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>2D Polylines &amp; Annotations</td>
<td>✔</td>
<td></td>
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<tr>
<td>Cameras</td>
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<tr>
<td>Reflection Maps</td>
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<tr>
<td>Bump Maps</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Custom Designed Templates</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>

In the PDF task bar, and before attempting to export to 3D PDF, the user needs to choose the PDF Settings for the exported 3D PDF file.
PDF Settings

PDF Settings dialog enables the user to control the look and behavior of the exported 3D PDF file(s). To open PDF Settings dialog, click Settings in the PDF task tab. The dialog has five tab, described below.

Template Tab

Template tab is where the user can select a 3D PDF template, browse to the folder containing the template to use, create New templates, Edit, Delete, or Refresh template(s). Clicking the New button will open Kinetics Template Designer.

Kinetics Designer is a simple Kinetics application that enables users to design and save their own templates, to be used when exporting their 3D models into 3D PDF or HTML5/Web GL or iPad/Android. For more details about Kinetics Designer, select Designer Help from the Settings/Help bar in Ashlar-Vellum Kinetics.
Page Tab

In this tab the user can add background music to the exported 3D PDF file, and a Password for protection. The user can check the Repeat option, to keep playing the music as long as the PDF file is open.
3D Tab

In this tab the user can set the properties of the 3D area in the 3D PDF template.

**Show 3D Toolbar;** shows or hides the 3D Toolbar in Acrobat reader when opening the exported 3D PDF file.

**Show World Axes;** shows or hides the world axes, in the lower left part of the exported 3D PDF file.

**Open Model Tree;** opens the 3D model’s tree in the exported 3D PDF file.

**Disable Selection;** disables/enables selection of geometries in the exported 3D PDF file.

**Navigation Mode;** the user can set the default navigation mode for the exported 3D PDF file to be Rotate, Spin or Walk. The user of the 3D PDF file can choose to change this default mode from inside the exported 3D PDF file.

**Default Render Mode;** using this option, the user can select the default render mode to be one of the following (Solid, Solid Wireframe, Transparent, Transparent Wireframe, Illustration, Shaded Illustration, Transparent Bounding Box, Solid Outline, or Bounding Box, Transparent Bounding Box Outline, Wireframe, Shaded Wireframe, Vertices, Shaded Vertices).
The images below show the same model using different render modes.

**Default Light Type**; light type can be one of the following: white, day, night, bright, CAD optimized, cube, or head lamp.

**Light Power**; increasing this value increases the brightness in the exported 3D PDF file.

**Navigation System**; in this group the user can set the navigation mode, in the exported 3D PDF file. The navigation mode can be either Default Navigation; which tends to focus on one object in the scene, or Kinetics Smart Navigation which is suitable for large scenes.

**Cameras / Scene States**; in this group the user can check the Show Kinetics Buttons Bar option, and choose an option for navigating different cameras / scene states in the exported 3D PDF file. Kinetics Buttons Bar can be:

- Artistic Arrows: arrows will be used for navigating between different cameras / scene states.
- Numbered Buttons: numbered buttons will be displayed to represent each camera / scene states.
- Preview Images: preview images of the exported scene states will be displayed to represent each camera / scene states. *(Available only in Ashlar-Vellum Kinetics)*

**Automatic Transition**; this option enables automatic switching between, the different cameras in the scene. When automatic camera is enabled, the user can select the Pause Duration, which is the time in seconds for which the camera will stand still before camera effect starts.

**Animate Camera Transition** is an option for animating the transition between different cameras in the scene. The Duration (seconds) is the time of the animated transition. In case of no animated transition.
Time before switching cameras = Pause Duration + Duration (seconds)

A user can select the camera effect to be Zoom, Roll or the two combined. The camera effect will take place for the camera effect duration.

In case the Automatic Camera option is not checked, the 3D PDF file will be exported with the scene cameras, but will not automatically switch between them.

The Preview Image group is available for the user to choose to include or not to include a preview image for the exported 3D PDF file. In case of selecting an image, it will be displayed when browsing for 3D PDF files, to help the user in selecting the required file. This image will also be displayed when the user first opens the 3D PDF file. The image can be a rendered view image of the model/scene.
Animation Tab

In this tab Ashlar-Vellum Kinetics users can set the properties of the animation(s) in the exported Kinetics 3D scene.

**Frames per Second (FPS);** is the number of frames played per second for all animations created in the exported 3D Kinetics scene. This controls the speed of playing all the animations in the scene, a value of 5 will result in a slower motion animation than a value of 15.

**Playing Mode;** is the mode to use when the animation(s) reaches an end. The Repeat option will keep on repeating the animation(s), from beginning to end, as long as the PDF file is open. Swing option will keep on playing the animation(s), from beginning to end then from end to beginning, as long as the PDF file is open. The Play Once option will play the animation(s) only once.
Advanced Tab

**Document Java Script and 3D Java Script;** can be used by advanced users to insert Java scripts to control both, the PDF document, and the included 3D model. Java scripts can be applied to designed templates, to make specific actions. Details about Java script support in 3D PDF files can be found at;  

**Make Protected / Disable Measurement;** this option is available for users to protect their exported 3D models, as it will prevent measurements of the model in the exported 3D PDF file.

**Preserve Images Original Resolution;** if the PDF template includes an image, this option when checked will preserve the image’s original resolution, and will increase the file size.

**Full Screen;** check box; if checked will make the 3D PDF file start in Full screen mode.

**Export Measurement and Text Annotations;** checkbox; when checked will enable exporting measurements and text annotations in a 3D scene to 3D PDF.

**Export Polylines:** when checked, 2D polylines in the scene will be exported.
Export Object Attributes; object attributes defined in the Properties dialog, for any object, can be exported into 3D PDF files by checking this option. This can help designers communicate data with files’ recipients.

Open file after export check box; will open the exported 3D PDF file.

3D PDF Export
After setting the different properties/settings for the 3D PDF file, clicking Export will open the Export Geometry window. The user can browse to the location to export the file to, and can input the file name.

After clicking the Save button, for 3D scenes with Scene States, the Manage Scene States dialog will appear. This dialog allows the user to check the scene states to include in the generated 3D PDF file, and the order of the scene states in the file, by using the up and down arrows.

For scenes with no Scene States, and which include multiple cameras the Cameras Manager dialog will appear. This dialog allows the user to order, rename, and select cameras to be included in the generated 3D PDF file.
3D PDF Merge

This option enables users to merge two or more PDF files together. This can be used to append a 3D model to a company’s header, or a project description available in PDF format. PDF files can be generated using different programs, such as; Acrobat, WinWord, PowerPoint, or Open Office. Different 3D PDF files generated using Kinetics products can also be merged together.

Upon selecting this option the Merge PDFs window will open. In the Merge PDF Window the user can click ‘+’ to add the PDF files to merge. Clicking ‘-’ will remove the selected file from the list, and the up and down arrows changes the order the files to be merged in.
3D PDF Embed

3D PDF template files can be embedded into WebGL/HTML. Clicking this function button will open the Embed PDF inside HTML dialog. In this dialog the user can choose the PDF file to embed, or create a new file. The Embed Fonts In HTML check box will include the template fonts in the exported PDF file. After setting all parameters, clicking Export will open the Export dialog. The user can input the file name, and choose its location, and then click Save.
WebGL sharing task

HTML Templates design is fully supported with advanced 2D layout. Behavior Actions can be exported into HTML5/WebGL, enabling users to create interactive 3D experience on the web. Reflection maps applied to 3D models are exported to HTML, giving them more realistic look. 3D scenes can be exported into HTML5 files, the same way 3D PDF files are exported.

In the WebGL task bar in the Sharing workbench, click Settings to open Html5 Settings window. In settings window the user can select the template to use, and choose the other html export settings. With a template selected, click the Export button, then enter the name and location of the (*.html) file and click Save.
For 3D scenes with scene states defined the Manage Scene States dialog will appear upon clicking Save. There the user can check the scene states to include in the exported html file, and their order.

**Html5 Settings**

Html5 Settings dialog enables the user to control the generated HTML file(s). Before exporting to HTML the user needs to select a template to use for export, and to set other HTML parameters.

**Template Tab**

Template tab is where the user can browse to the folder containing the HTML template(s) to use, create New templates, Edit, Delete, or Refresh template(s).

Clicking the New button will open Kinetics Designer window. Kinetics Designer is a simple application that enables users to design and save their own templates. For more details about Kinetics Designer, select Designer Help from the Settings/Help bar in Ashlar-Vellum Kinetics.

Embed Fonts In HTML option, when checked, will include the font used in the template, in case of using distributable fonts.
3D Tab

In this tab the user can set the properties for the 3D Area. The **Keep Camera Above Ground** option allows architects to prevent viewers of their 3D models from viewing under the buildings. The user can also select the navigation mode in the exported HTML file. Spin navigation mode adds great navigation experience.
Advanced Tab

Document Java Script and 3D Java Script can be used by advanced users to insert Java scripts to control both, the HTML document, and the included 3D model. Java scripts can be applied to designed templates, to make specific actions. Details about Java script support in WebGL can be found at the scripting help in Ashlar-Vellum Kinetics.
Android/iPad sharing task

3D scenes created in Ashlar-Vellum Kinetics can be exported into iPad/Android. The exported scenes will be saved in Kinetics Archive File format (*.zim), readable by Kinetics CAD viewer. Kinetics CAD Viewer can be installed from Apple iTunes and Google play.

Information exported to iPad/Android includes: geometries, normals, materials, textures, cameras, animation, scene states, and Kinetics templates.

Templates for iPad/Android viewers

Templates created for Kinetics iPad/Android viewers should be created as follows;

- From Android/iPad Settings dialog, click New to open Kinetics template designer. The Page Size dialog will appear, so create a page with an aspect ratio close to the aspect ratio of the device you are exporting to, aspect ratio is width to height percentage. For iPad the aspect ratio is 4:3, so a page with 1000 pixels width and 750 pixels height will be ok.
- Add a 3D area that covers the whole template page. In the properties dialog on the left, the user can select the Background Fill Mode for the 3D area to be:
  - Transparent
  - Single Color
  - Image

- On top of the 3D area add images/text, and link them to messages, URLs, or scene states.
- Add images for different products, and different materials along with links to their scene states created in Ashlar-Vellum Kinetics. Other actions can be added to an image, as described in Kinetics Actions section.
iPad /Android Settings

iPad settings dialog consists of four tabs:

Template Tab

Template tab is where the user can browse to the folder containing the iPad/Android template(s) to use, create New templates, Edit, Delete, or Refresh template(s).

Clicking the New button will open Kinetics Designer window. Kinetics Designer is a simple application that enables users to design and save their own templates. To learn more about Kinetics Designer, click the Help combo-box in the Setting/Help bar, and select Designer Help.
3D Tab

In this tab the user can set the properties of the 3D Area in the template. The ‘Keep Camera Above Ground’ option allows architects to prevent viewers of their 3D models from viewing under the buildings.

The user can also select the navigation mode in the exported (*.zim) file. Spin navigation mode adds great navigation experience. In the Light Power spin box, the user can increase/decrease the light power in the generated template and thus in the exported (*.zim) file.
Animation Tab

For scenes that include animation, checking the Show Time Line option will display the time line on top of the template.
**Advanced Tab**

In this tab, and by checking the Make Protected option, the exported (*.zim) file will only be viewable using Kinetics CAD Viewer. The file will not be readable by Ashlar-Vellum Kinetics, and thus the 3D models included in the file are protected.

The Export Polylines option, when checked, enables exporting polylines included in the 3D scene. Checking the option Include Dictionary will make the current values set in the dictionary to be saved in the generated zim file.
Rendering workbench

Ashlar-Vellum Kinetics Real Time Renderer (Kinetics RT) is a powerful, fast, and easy to use real time renderer; that has full integration with Ashlar-Vellum Kinetics. The renderer is optimally parallelized, so it can take advantage of all the CPUs available in the machine. Kinetics RT renderer is suitable for MCAD, interior and exterior rendering, producing top quality rendered images. To learn more about Kinetics RT renderer, click Help in the Setting/Help bar, and select Render Help.

Thanks to HDR Light Studio http://www.hdrlightstudio.com for providing us with high quality HDR images included in Ashlar-Vellum Kinetics.
Rendering workbench provides the user with all tasks necessary to create professional high quality rendered images/movies.

**Render task**

Clicking Render task bar will display the Render Settings in the Tree/Task Panel. In the library part of the application interface, the general render settings library will be shown. Clicking the ‘+’ button in this library will add a new setting that stores current settings in the Render, Environment, and Background tasks. In the image shown below different settings where changed in the Render, Environment, and Background task bars that resulted in the rendered image shown. Clicking the add button in the render settings library, displays the Add New Item dialog. The name and preview image for the rendering can be entered, in this dialog. This will add the preview image to the library.
Render Settings

In this panel the user can set the main rendering parameters. For rendering mode, Ashlar-Vellum Kinetics supports three types of rendering modes, with the following parameters;

**Render Max Depth;** is the number of ray bounces of the light. Increasing the number of ray bounces improves lighting for complex scenes, especially diamond and glass scenes, but it slows rendering.

**Automatic locking Time (seconds);** is the time in seconds after which the image will be locked for navigation, in case of Real Time View rendering. Setting this value to Zero will disable automatic locking.

**Image ratio during navigation;** is the ratio of the rendered image dimensions to use while navigating the scene.
Number of cores to be ignored; is the number of CPU cores not be used by the renderer. This is helpful when the user is working on other applications while rendering. Setting this parameter to 0 will use all cores for rendering.

All rendering modes have a check box option to Show real time renderer statistics during real time rendering, which will display the progress statistics of the real time renderer on top of the rendering area.

Real Time View
Clicking this function will start real time rendering for the 3D scene, using the parameters in Render Settings. The function short-cut is F4, and RT rendering can be stopped by un-toggling the Real Time function button or pressing F4.

Real Time Clay Mode
This function starts real time rendering in clay mode. Which is a real time rendering mode used for viewing the effect of lights in scenes, by changing all materials, except glass and emitter materials, to gray matt

Render Fixed Size
This function starts real time rendering for the 3D scene, with a fixed image size. The image size used will be the one set in the Output Image task.

Render to File
This type of rendering is time limited, with a fixed image size, as in Fixed-Render. The value to end/limit rendering time is SPP (Sample Per Pixel) value. This value can be found in Render Settings under the Output Image task.

Limited time renderings is automatically used by Animation Rendering, Scene States Rendering, and Render to File

Render Scene States
For 3D scenes with scene states this function will start consecutive rendering for the scene states defined in the scene. Manage Scene States dialog will appear for the user to check the scene states to render, and the order of rendering. Clicking Ok will start limited time rendering based on the SPP value.
Animation Render group

In a 3D scene with animation defined, clicking Animation function will start rendering animation. Animation rendering is a limited time rendering, from the From Frame to the To Frame set in the corresponding spin-boxes, in the same task.

Package Render group

Distribute rendering is supported in Ashlar-Vellum Kinetics. It allows the user to distribute rendering of complex animations, among a number of machines. With the animation ‘*.sim’ file opened click Distribute function to open Distribute Render Animation dialog.

Fill in the required settings, and then click the Generate Rendering Packages button. The output folder containing the packages will open, since the Open containing folder option was checked in the dialog.
A number of (*.srd) files equivalent to the number of machines input in the dialog, will be saved in the output folder.

Copy each file to a rendering machine that has Ashlar-Vellum Kinetics already installed. Click the Render function, in the Package group, to open its dialog. Browse to the rendering package (*.srd) file, and select the output folder. Check the Open output folder option, and then click Start Rendering. A rendering animation progress bar will continue to appear along with rendering menus until the animation rendering is done.
Pause/Resume render

This function pauses any of the rendering functions in the Render workbench task. The Rendering Paused window will appear in the middle of the 3D area. The user can click the Continue Rendering button in this window to resume rendering.

Capture Viewer Image

At any point of rendering, clicking this function button will open the Save Image dialog. The user can select the folder to save the image to, as well as the image format.
Environment task

3D scenes require some sort of lighting, to give 3D scenes/models a more realistic look. Environments for rendering in Kinetics RT can get lighting from HDR, from Sun, or from lights and emitters defined in the scene. The user has the option mix and match between these light sources. This can be done by enabling the HDR and the Sun each from its Render Settings dialog. Adding scene defined light sources can be done in the Scene Building workbench - Light task.

HDR Environment

Clicking the HDR option will display its Render Settings in the Tree/Task Panel. HDR is the easiest method for achieving photorealistic views of MCAD, and studio shots of a product, HDR’s are files of types (*.hdr) or (*.exr). Environment images are applied as a sphere surrounding the 3D scene. They include light sources that are automatically used when rendering the 3D Scene.

To select an HDR file click the Environment image in the Render Settings dialog, shown below. This will open a windows dialog where the user can browse to the HDR file to use. Or just double click an HDR image from the library panel.

In the image shown below, to display the selected HDR, the user needs to make sure that the background is set to Environment.
The color and brightness of the HDR image can be adjusted in the Render Settings dialog, and the new settings will automatically be saved and applied. The user can also rotate the Environment image, by adjusting its slider in the Render Settings dialog.

Ashlar-Vellum Kinetics provides a number of HDR environment images, free and commercial environment images can be used to extend the Ashlar-Vellum Kinetics selection of environment images.
Sun Environment

This environment setting simulates physical sky at different sun angles (Solar Elevation), which determines the time of the day. The sliders of the parameters of this environment option, makes it easy for the user to view the effect of each parameter, in real time.

The user can select to Enable Sun, in the render settings, in addition to enabling the HDR. The result will give the rendered image the sun shadow effect, as shown in the image below.

The user has multiple parameters to control the sky:

Albedo
This parameter controls the effect of ground color reflection, which in turn affects the color and feel of the sky.

Turbidity
This parameter affects the clarity of the sky.

Solar Elevation
This angle (in degrees) determines the time of the day. Low angles represent sunrise or sunset, and high angles bring the sun towards the middle of the day. The sun angle can be also set from the Light task of the Scene Building workbench.

Solar Horizontal Angle
This parameter sets the rotation of the sun around the zenith.
Users not comfortable with specifying numerical values for Solar Elevation, and Solar Horizontal Angle, can add Sun Light for the Light toolbar. Changing the direction of the sun, using its draggers, and then clicking the accept mark; will update the values in these two fields, if the Sun is selected as the light source.

Sky Strength and Sun Strength
These two parameters can be used to increase/decrease the sky/sun strength effect on the rendered image.
More details about rendering parameters can be found in Renderer Help, under the Help menu in the Settings/Help Bar of the application interface.

Render Solar Disc
This check box option, when checked, will show the solar disc in the rendered image.
Ground

When setting the environment light source for rendering, the user has options for adding ground shadow and/or ground reflection to the 2D ground.

Ground Shadow

When clicked, its Render Settings will appear in the Tree/Task Panel. This option will generate shadows on the ground, and the user can select the color and strength of the generated shadows. To apply the shadow settings to rendering, the user needs to check the Enable Ground Shadow option.

Ground Reflection

Turns the ground into a reflective plane, where the user controls reflection color, roughness, and strength. The Enable Fresnel option determines whether fresnel reflections are enabled or disabled. To simulate metallic looking reflections, Fresnel reflections should be disabled. Environment Reflection option, reflects the scene’s environment when checked. To apply the reflection settings to rendering, the user needs to check the Enable Ground Reflection option.
**Background task**

The background for rendering can be one of four options;

From Environment

Selecting this background option will apply Environment settings to the rendering background.

Single Color Background

With this background option the user can select a color to use for the background of the rendered image.

Background Image

This background setting option requires the user to browse to an image file to be used for the background of the rendered image.
Spherical Background

Spherical Background; enables the user to select (*.hdr), (*.exr), or any image file, that will be wrapped around a sphere or hemisphere, and select color, size and brightness. This option is added to give users more control since the Environment-HDR (global HDR) in the Render Settings dialog can be rotated, but cannot be scaled.

The user can click the Image in the Render Settings dialog, and browse to an HDR image file. Then by clicking the ‘+’ Add to HDR library button, the current image will be added to the library. A unique name should be given to each HDR image.
Image Effects task

Ashlar-Vellum Kinetics provides its users with image post processing capabilities. Any combinations of image effects can be applied to a rendered image. In this task the Tree/Task panel will display the Render Settings for the image. The supported effects are described below;

**Vignetting**
This effect is a reduction of an image’s brightness/saturation, at the periphery of the image compared to its center.

**Gray Scale**
This effect renders the image in gray scale.

**Edges**
This effect renders the current model with edges shown.

**Blooming**
A glow added to the rendered image. The user can change the Blur Radius, Brightness, and Opacity for this effect.

**Cool, Warm, & Saturation**
These image effects can be applied by setting a delta value, and they can be applied exclusively.
Output Image task

In this task bar the user can select the format for the output image and its dimensions. The Tree/Task panel will display Render Settings dialog. In this dialog the user can input the base file name, the output folder, and SPP to limit the rendering. The open containing folder check option will open the output folder after finishing rendering.

Material task

This task is the same as in the Material task described in Scene Building workbench.

Camera task

This task is the same as in the Camera task described in Scene Building workbench.

Scene States task

This task is the same as in the Scene States task described in Scene Building workbench.
Animation workbench

Ashlar-Vellum Kinetics Animation supports four types of animation:

- Object/key frame animation
- Camera animation
- Light animation
- Material animation
- Hide/Show animation

Animation in Ashlar-Vellum Kinetics is very easy. A user can apply any of the predefined animations on selected object(s). The user can define his own key frame animations by doing one of the following, at a frame other than Zero:

1- Applying any of the transforms in the Main Toolbar, to any 3D Object(s), Camera(s), and Light(s).
2- Changing properties of Materials, Cameras, Lights, and Hide/Show.

Animation Timeline

Time Line provides the user with a tool to visualize and edit animation key frames. The time line is displayed by default in the Library panel of the Animation workbench. Click the Show/Hide details button in the top right part of the time line, to show or hide the timeline details.

In the timeline the user can also set the animation duration, by setting the end key frame value.

The current frame is marked on the time line by a red vertical line. The names of the animated objects appear on the left part of the time line, clicking on the name of any object automatically selects it in the 3D area.

The user can play animation by clicking the Play Animation button in the animation time line, or by hitting the Space Bar. The tool bar also includes the tool buttons Go to First Frame (Shortcut Home) and Go to Last Frame (Shortcut End).
It also includes the Director Record button, which can be used for managing animations from multiple cameras. Clicking on an animation key frame on the time line will show its properties, in the Properties panel. The user can change these properties, for different types of animation. The user can also change the location of any key frame on the time line, by selecting then dragging it from a location to another.

Time Line supports copying key frames. For example, in the following picture, to make sure the swing's initial and final transforms match exactly, you would copy frame 0 to the final frame. To do so, select frame 0, click Ctrl+C, then move the new frame to the final frame.

The user can drag a selection box to copy multiple key frames. The user can delete all the key frames by clicking the Delete All Animations tool button in the time line.

**Object Task**

In this task bar show/hide object animations can be created, and predefined ones can be used.
Show /Hide Object Animation

Selecting a 3D object at any frame other than zero, and clicking Hide from Object Animation group, will add a key frame at that location, and the object will be hidden there. Another key frame will be added at frame zero, with the object shown. Using these two functions hide/show animations can be created easily.

Round Table

Round Table Object animation rotates the selected object by default, 360 degrees around the global z axis. The animation starts at frame 0 and ends at the last specified frame. Selecting the green animation line of the object, in the Time Line, will display the animation parameters in the properties panel of the application interface, as shown in the image below.

The user can select to change the Start/End frames, as well as the angle of rotation. In the image below, the car is by default rotating 360 degrees. Changing the Angle value to 90 will rotate the car 90 degrees only as shown in the next image.
Wheel Animation

Wheel Animation is useful for rotating object(s) around a selected axis. To create wheel animation the user needs to select the object(s) to be rotated, then to click this function button. In the image shown below one of the loader’s tires were selected. To be able to precisely select the wheel’s center, change the pick mode to Pick Center of Curvature. This will generate edges for the whole scene, and will select the center of the selected curvature precisely. The wheel animation dialog will appear where the user can set the animation parameters.
Select the start frame for the animation, the end frame, and the number of revolutions. Number of revolutions is the number of full rotations to be done by the selected object(s). The user can also select the rotation direction to be Clockwise or Counter Clockwise, the direction is determined using the right hand rule around the rotation axis, always points out of the geometry.

Click Pick Center, and select the circle of the tire. The normal of the circle’s center will be highlighted, click the approve icon to end the process. As can be seen in the image, an animation line for the Tier has been added to the time line.

Selecting this green line will display wheel animation parameters, in the Properties Panel of Ashlar-Vellum Kinetics interface. The user can change the Start and End frames for the animation, as well as the angle of rotation. In the Wheel Animation dialog shown above, the Number of Revolutions was set to 10. This will result in $10 \times 360 = 3,600$ angle of rotation.

Following the same steps, the user can create wheel animations to the other three tires of the loader.
Follow Path

Path animation can be used to make an object follow a predefined path. This object can be a 3D object, a camera or a light in the scene.

Following are the steps for creating object follow path animation:

- Create a Path (Open, Closed, or Circular), from the Create task in the Scene Building workbench. In the image shown below an open path was created for the loader to follow.
• The pointer is set at frame 40, using the move 2D tool bring the loader closer to the path, and align it. As can be seen in the image below, two key frames were added for the loader. The first one at frame zero with its original position and orientation, and the second one at frame 40 with the new position and orientation.

• With the loader still selected click the Follow Path function button and the Path Animation dialog will appear. Change the Begin Frame value to 40, to apply the path animation from that frame, and then click Pick Path.
• Select the path by picking on any of its points, and the loader will be oriented as shown below.

• Click the approve button to end the follow path animation.
The same steps are followed to create camera follow path animation, with some tweaks:

- Create a path, as described before, then using the Move 3D function, under the Move task, move it in the Z direction.

- In the Scene Building workbench, in the Camera task, create a new camera.
- Back to the Animation workbench, select the new camera then click Follow Path function.
• In the Path Animation dialog click Pick Path, and select the path just created.

• The draggers will appear, use them to orient the camera to the path then click the Approve icon.
A path animation line will be added to the animation line for new camera.

**Move task**

This task is the same as in the Move task described in Scene Building workbench. The user can apply any of these transforms to the selected model(s), at a frame other than zero, and create key frame animation.

As shown in the above follow path example, the move 2D function has been used to create a key frame animation.

**Material task**

This task is the same as in the Material task described in Scene Building workbench. The user can change material properties for the selected model(s), at a frame other than zero, and create key frame animation where the material properties will be gradually changed.
Camera task

In this task bar the user can create key frames camera animations, as well as use predefined camera animation functions.

Capture Camera

Captures the current view in the 3D area with an animated camera, and creates a key frame at the current location on the animation TimeLine. In the loader example, the view needs to change at different stages of the animation. At frame zero align the view to show a general view of the loader along with the path, and then click Capture Camera.

At frame 40 when the loader is closer to the path, bring the view closer and click the Capture button again. The user can add as many camera capture key frames, to give more focus to different parts of the scene, at different stages of the animation.
Round Table
This function creates a camera animation, for the whole scene, that rotates 360 degrees around the global Z axis. By default this animation starts at frame 0 and ends at the last frame of the animation.

Helical
Creates an animation that rotates the camera 360 degrees around the global Z axis, with translation from the current elevation of the camera to the ground (Z = 0), suitable for showing high buildings.

Director Record
Director Camera gives the user the ability to create animations that combine views from multiple animated cameras/views, in a scene. Clicking the Director Record button will create a new camera named director camera and adds it to the Object Tree. The director camera will start recording the views from the existing camera in the active view.

To start; split the 3D area into four views, by selecting 4 Views from the Window configuration, in the Common Toolbar. Define camera animations/view orientations for three of the views, and link them. Linking a camera to a view can be done by dragging the camera and dropping it onto the
Another way to do that is by using the Connect function under Camera task, in the Scene Building and the Rendering workbenches.

Select the view to start recording from, and then click on the Director Record button. Animation will be played, and the director camera will be recording the animation of camera in the active view. The user can click on another view to make it the active one, which makes the director camera records its animation.
The user can switch between the views as many times as needed.

At the end of the process the user will get a new camera named director camera in the Object Tree. The user can drop the director camera on one of the views and play animation to see its content.
**Camera Center**

The functions in this group are for setting the center of the camera, and are as described in the Camera task in the Scene Building workbench.

**Light Animation**

Similar to cameras, lights in Ashlar-Vellum Kinetics are objects, which mean object transformation animations can be applied to them. In addition to moving lights, the user can change their properties at different key frames. This can create an animation showing properties transitions.

In the following images, power, color and direction of a directional light were modified to create 3 key frames. This kind of animation can be used to simulate the sun light changes.

![Image of light animation examples](image)

**Material Animation**

Material animation can be used to show different material combinations of a product. After importing the press model, blue metal material was assigned to the body of the press, by dropping it from the material library, at frame 0.
Change the current frame, in the animation time line, to frame 100, and change the material properties to red.

Playing the animation will show the material transitioning its properties from what was set at frame 0 and what was set at the last frame. The following image shows the model at frame 50.
**Material Animation Tips**

Best material transition results can be achieved when changing material properties of the same material type. As shown in the previous example, properties were changed, for the same Metal material type.

During material animation a user can change the material type. In this case it is advised to manage the material type transition. For example if the user is using metal material at frame 0 and plastic material at frame 100, the user should play the animation, to see if the material transition is consistent with the expectations. The user can manage the material transition by adding metal material at frame 50 and plastic material at frame 51, and by setting the material properties in a way to insures smooth transition.

**Key Frames Task**

In this task bar the user can delete all the key frames in the animation timeline, by clicking the corresponding button. The user can also scale the time line.

![Key Frame](image)

**Scale Time Line**

If the user feels the animation is fast, this option gives the ability to upscale the timeline, by a factor. Different key frames on the time line will be scaled in proportions.

The Translate factor changes the start location of time line, to be different than 0. The minus sign direction option is given in case the user translates the time line, and then needs to bring it backwards.
Video task

Create Video From View

This function can be used to share animations created in Ashlar-Vellum Kinetics with others. The Viewer Video Export dialog will open, where the user can select the frames to include in the generated video/images, or check the Full Animation option.

If the Generate Video option is not checked clicking the Create button will generate images, for all the selected key frames, in the render output folder. When the Generate Video option is checked, video will be created using another application for creating videos.

If the Generate Video option is checked the user can choose an audio file to add to the generated movie. The video quality, frame rate, and output formats can also be set in this dialog.
Automation workbench

Automation workbench allows the user to use Java scripting to automate processes in Ashlar-Vellum Kinetics. The user can run scripts interactivity from inside Ashlar-Vellum Kinetics by dragging a script from the library and dropping it on the 3D area, or selecting it and clicking Run. The user can run the script from the command line by using the argument –js “Java script name”. Running from the command line requires licenses for the features Automation and Command Line. Scripting can be used for example to automate the task of importing a file, generating preview images (top, front, perspective), adding round table animation, then exporting a 3D PDF file, or to import files from a large database of 3D models, then setting a good view, rendering an image for each material option.

Automation workbench allows the user to Run, Edit, and Debug Java scripts.
Ashlar-Vellum Kinetics shares the same Java script when possible with 3D PDF and WebGL, which makes it very easy to utilize the same knowledge in creating scripts, the user can use Ashlar-Vellum Kinetics to develop and test scripts to be used later in 3D PDF and WebGL.

The reference document for Java scripting is available with Ashlar-Vellum Kinetics; the easiest way to learn Ashlar-Vellum Kinetics scripting is to investigate the scripts in the tutorial group in the scripting library.

When running scripts interactivity the script can ask the user to select an object, to define a material or to pick a location or direction from the 3D area, as shown in the following image.

In addition to automating repetitive tasks, the user can use scripting to arrange objects in Ashlar-Vellum Kinetics.
## Hotkeys

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