

# TURN TOOL

**TurnToolBox for ArchiCAD**

**Manual**

**Version 2008**

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## 1. Bringing 3D to the Internet

TurnTool is a real time 3D graphics solution targeted at the growing market for 3D on the Internet.

Integrate your 3D visualizations in web pages and other applications for interactive viewing and manipulation - responding to user input from mouse and keyboard. Knock your audience off their feet in amazement!

The TurnToolBox for ArchiCAD is a plugin for Graphisoft's architectural application ArchiCAD.. It makes it very easy to create breathtaking interactive 3D visualizations. Note that the TurnToolbox plugins exists for other 3D applications as well.

For our customers' target audience, we make the viewing of this amazing 3D content as easy as pumpkin pie. The TurnTool Viewer is freely available for download from TurnTool's website and supports automatic installation when viewing TurnTool content. The compact size of TNT-files makes the download of each 3D visualization painless.

TurnTool takes the lead in online 3D visualization by allowing ultra fast downloads and still preserving a high quality of graphics and functionality.

### ***1.1. The TurnToolBox and the TurnTool Viewer***

The TurnTool technology consists of two main components: The TurnToolBox and the TurnTool Viewer. The TurnToolBox generates TNT-files. The TurnTool Viewer enables the user to view the TNT-files directly in their browser.

TurnTool has been developed by experienced game programmers and is likely to be nothing less than a revolutionary contender for the Web3D market. With competing products focusing on either file download sizes or quality of 3D content, TurnTool sets a new standard in both areas for an unsurpassed experience.

TurnTool presents itself as a convenient solution to all potential web3D content providers - big or small. Both buying it and selling it is easy. There are no difficult pricing policies to understand. We do not want any money from your customers (unless they insist).

With TurnTool, you just pay for the software. Finally, you can devote your attention to what is important: creating great 3D models and worlds for online display.

## **1.2. Quality and Speed**

The TurnTool plugin and 3D content download sizes are confined to a minimum while preserving a high quality of 3D display. The TurnTool file (TNT file) can be implemented as an integrated part of an overall graphics design by means of background image files - or by means of a transparent background.

### **1.2.1. Easily Integrated**

As an ActiveX control, the TurnTool Viewer can be integrated with an endless list of applications. To name but a few: Microsoft Internet Explorer, Microsoft PowerPoint and Macromedia Director are examples of these. (See chapter 1 in TurnToolBox Scripting Manual: "Integrating TurnTool")

### **1.2.2. Easy To Use**

TurnTool is easy to use and you do not have to learn an external editor. All editing is done from within the ArchiCAD's interface and TurnTool does the hard work of translating data to the TNT file.

### **1.2.3. Flexible**

TurnTool has been designed with a maximum focus on flexibility. The engine is divided into components, each residing in respective libraries. The hardware abstraction layer provides TurnTool with the capability to support many APIs and driver systems such as DirectX and OpenGL. It also enables special attention and continuous development of each component for efficient updating of the TurnTool software.

### **1.2.4. Outstanding Quality**

TurnTool delivers an outstanding quality of graphics with state-of-the-art antialiasing of objects and a crystal clear display of textures. Using very flexible scripting options, virtually any scene and/or functionality imaginable can be accomplished - ranging from simple product visualizations to full-blown 3D architectural visualizations and even large landscapes.

## 2. System Requirements

TurnToolBox for ArchiCAD minimum requirements:  
ArchiCAD9 or later

TurnTool Viewer minimum requirements:

- Windows 95, 98, Me, NT4, 2000 or XP
- DirectX 7.0 or later or OpenGL 1.1 or later
- 32 MB system memory or more
- Pentium 133 processor or greater

Recommended configuration:

- Pentium II processor or greater
- OpenGL or DirectX compliant 3D graphics hardware

Browsers supported by the TurnTool Viewer:

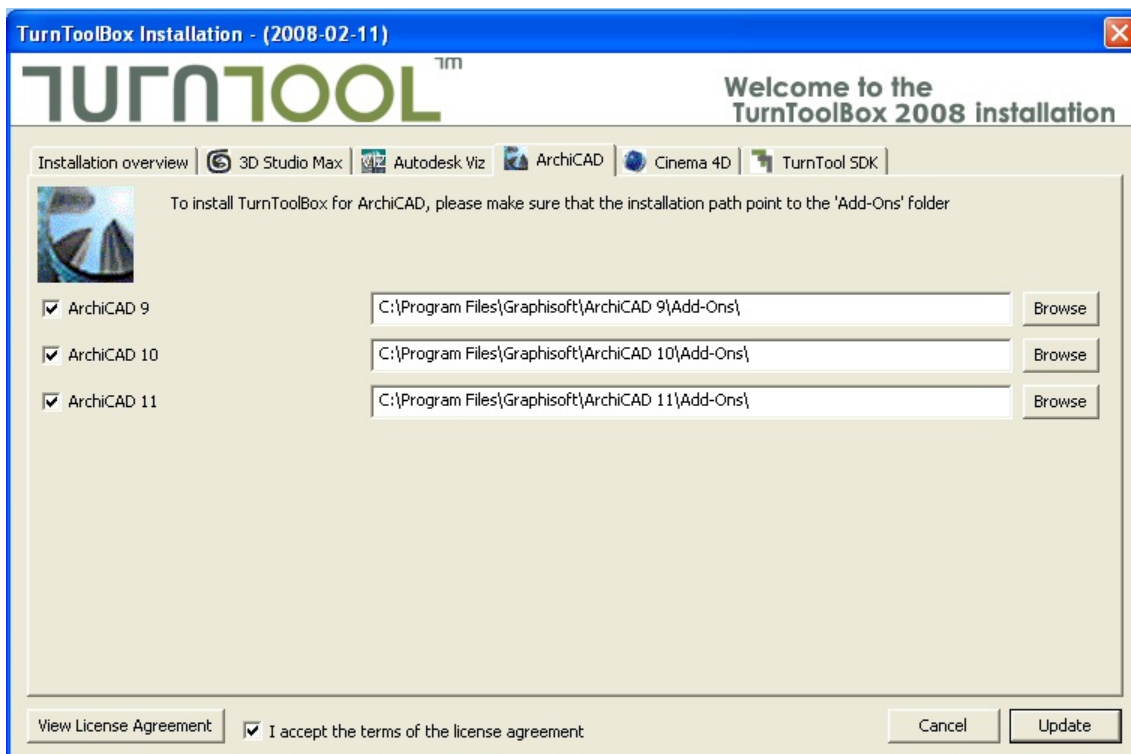
- Microsoft Internet Explorer 4.0 or later
- Mozilla Browser 0.9.2 or later
- Netscape Browser 6.1 or later
- Mozilla Firefox 1.0 or later

### 3. Installation

To install the TurnTool software, please go to the TurnTool website and download it from there or use the link below. That way you make sure you have the latest version.

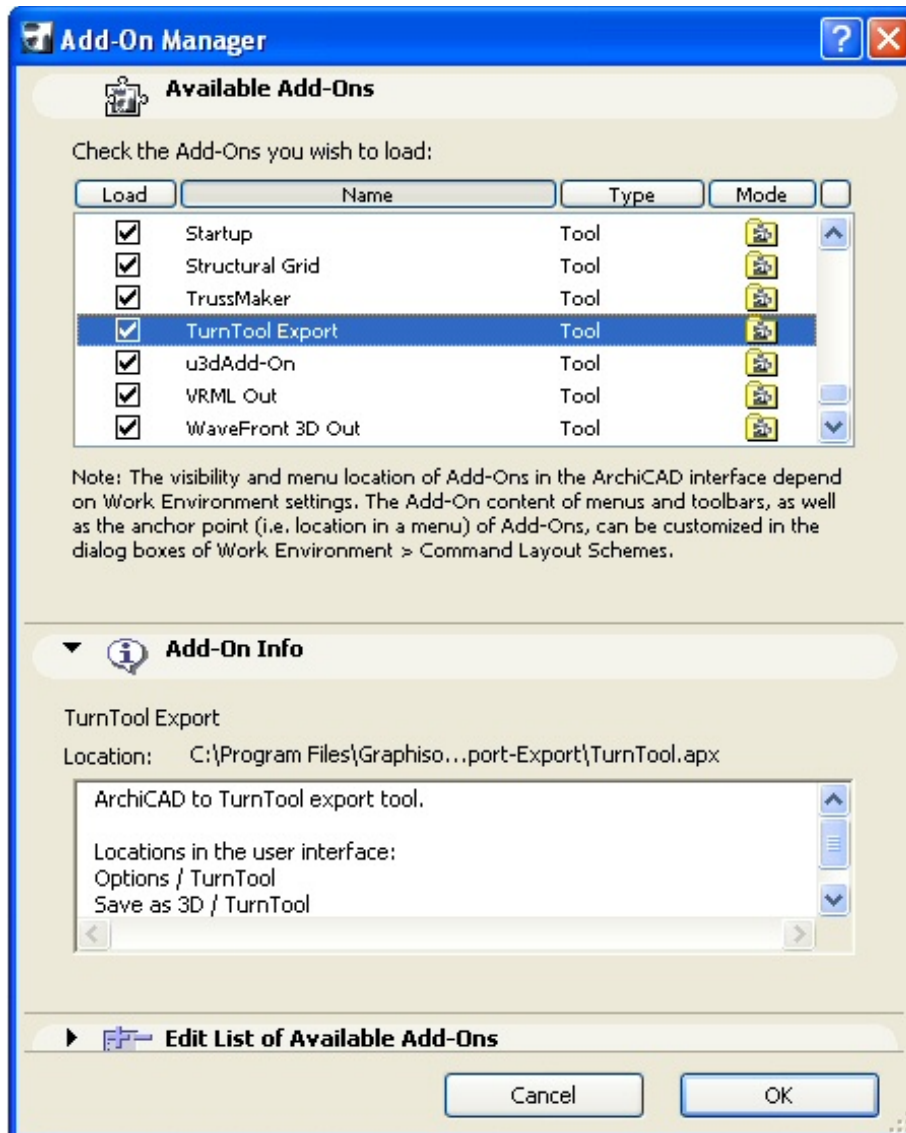
<http://www.turntool.com/ToolboxInstall.exe>

Download and launch the file above. Follow the on-screen instructions to install the plug-in for your ArchiCAD9, ArchiCAD10 or ArchiCAD11 application.



After installation, start up ArchiCAD. You can now export your file as a TNT file by selecting Save As from the file menu while in 3D window and selecting TurnTool Export from the File Type drop down menu.

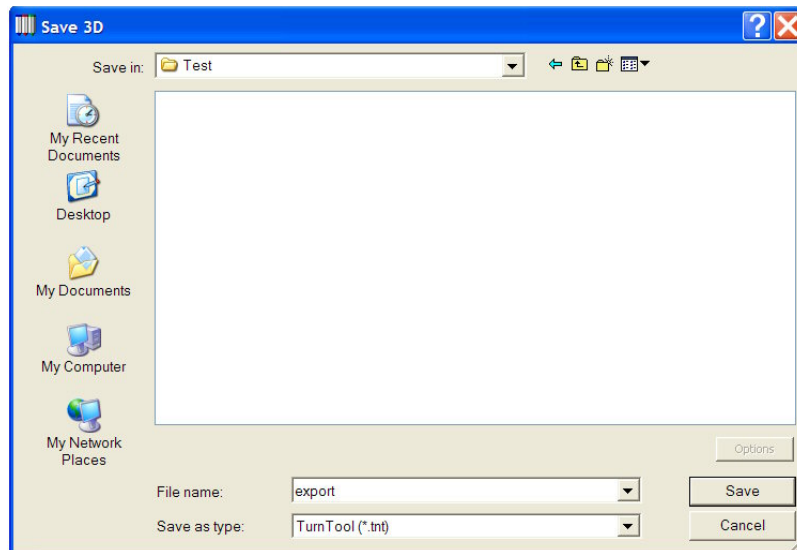
You can verify the TurnTool installation in Add-On Manager of ArchiCAD. TurnTool add-on needs to be present and loaded as depicted on the image bellow. If TurnTool add-on is not available you can load it manually using "Search for more Add-Ons" button.



### 3.1.Export

To export your project as TNT file follow these steps:

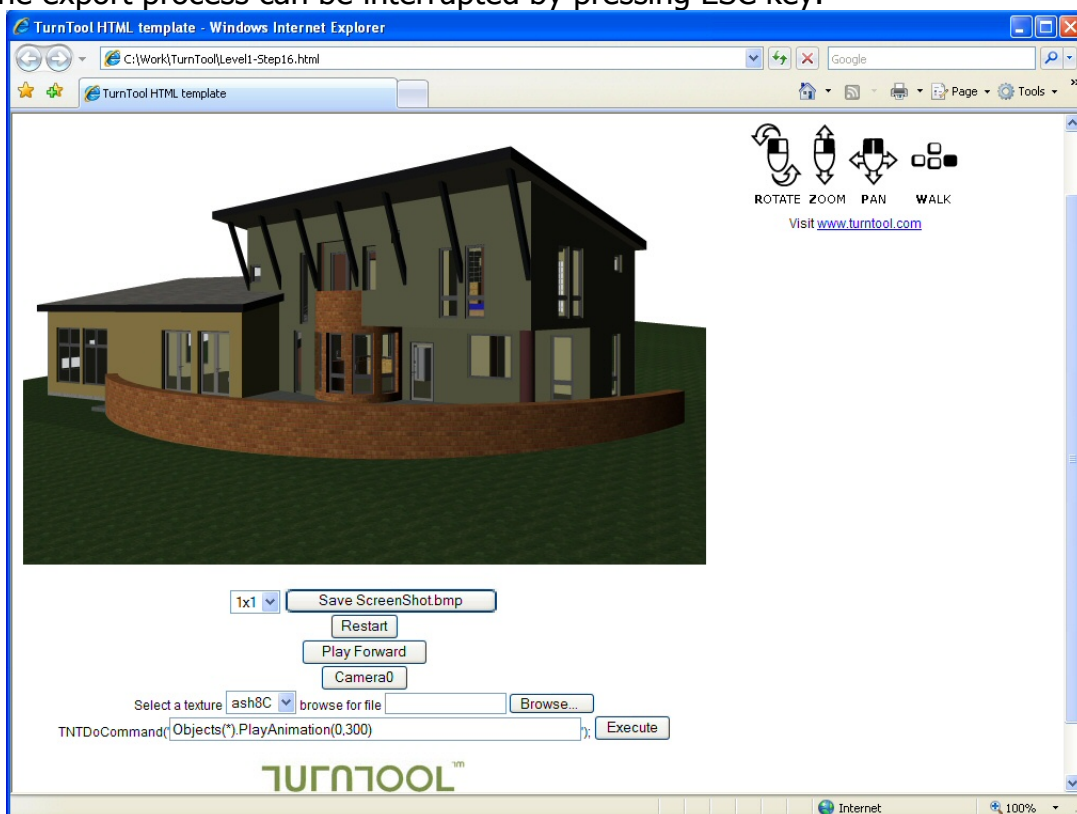
- Switch to 3D Window of ArchiCAD
  - Right-click on plan to open context sensitive menu and select "3D Window"
  - This is necessary for exporting 3D data from the ArchiCAD – the exported content is based on what is visible in 3D Window. This allows to export part of the project (e.g. single story, selected object only).
- Select File/Save As from ArchiCAD's menu
- Select "TurnTool" as "Save as type"



TurnTool properties are manipulated through individual tabs of TurnTool export options panel. The panel opens automatically when clicking on "Save" button. For details on export options consult chapter 5: TurnTool Export Options.

When exporting, TurnTool generates a TNT file and an html document containing an object of the TNT file. Click on either the html file or the TNT file to view the scene. Enabling the "Show HTML" checkbox in the options panel when exporting will view the HTML document automatically.

The export process can be interrupted by pressing ESC key.



## 4. Creating TurnTool Content

Modeling a 3D scene for real time display with TurnTool is quite similar to using other tools for real time 3D. Follow a few rules of thumb and you are ready to create fantastic real time TurnTool content of your 3D artistry.

Building geometry for real time output requires an attention to the number of polygons used in the project. For most scenes, a compromise between detail and file output size must be determined to ensure a good balance of quality versus speed.

A good rule of thumb, when building an ArchiCAD project for TurnTool export, is: the more polygons and textures in a scene, the slower the rendering speed. A scene with 30.000 polygons or less, and with less than about 5 MB of texture images (uncompressed) will perform well even on systems just barely meeting the minimum system requirements.

This is just a rule of thumb, as you will also have to take into account the number and size of texture maps, and lights used in the scene, as well as the target system. High-end systems will be able to show much more detailed scenes perfectly fluent (100.000 + polygons and 30-60 MB of textures). TurnTool presents one of the fastest rendering engines ever created and you will find the performance very good with even large scenes.

Note that TurnTool exporter uses the background information from the settings of the Internal rendering engine of ArchiCAD. You can use single color background, sky/ground gradient background or background image. Consult ArchiCAD manual for details on setting the background for ArchiCAD internal engine.

## 5. TurnTool Export Options

TurnTool exposes a number of properties related to different export, rendering and controlling aspects of the scene. These properties are manipulated through an set of tabs of TurnTool panel. TurnTool panel is opened automatically any time you attempt to export your data from ArchiCAD.

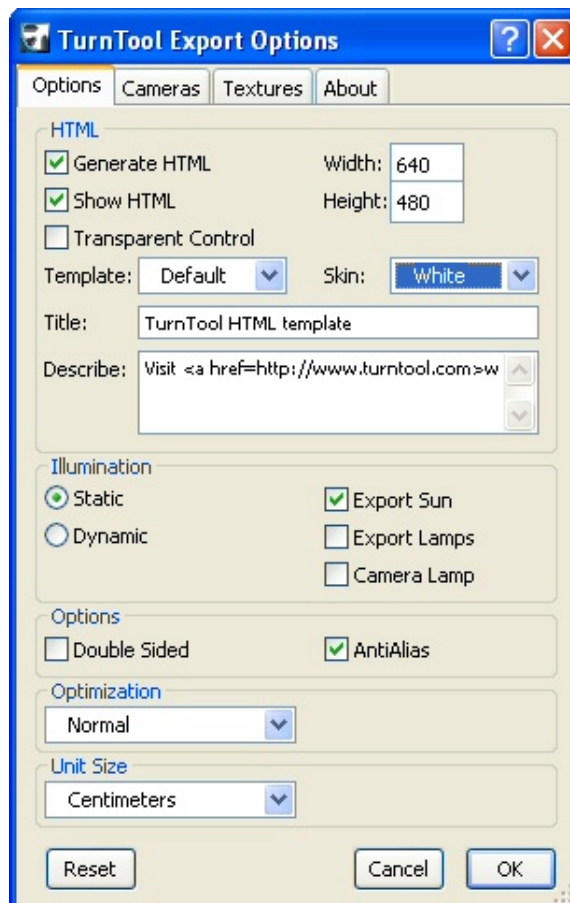
**Reset:** Button will reset the values of the panel to their default values.

**Cancel:** Button cancels the export.

**OK:** Button exports a TNT file.

### 5.1. Options Tab

The tab contains export parameters and buttons to actually export and view the result.



### HTML:

**Generate HTML:** HTML file will be generated if checked.

**Show HTML:** HTML file will be preview in Web browser upon completing the export.

**Transparent Control:** If checked, the TurnTool control will be transparent so that any web page content underneath it, will be visible through it.

**Width:** Width (in pixels) of the TurnTool control.

**Height:** Height (in pixels) of the TurnTool control.

**Template:** TurnTool template that is used for generating the html. It is possible to choose from the following:

- **CollectorGame:** Simple Game to collect objects.
- **Default:** Standard layout.
- **Move:** Where it is possible to move around the objects.
- **PhysicsAdjuster:** Where it's possible to adjust the scene physics.
- **Simple:** Simple, clean layout.
- **SimpleArchitect:** Where it is possible to change between cameras to use for the exported project. You can choose from installed TurnTool templates in the drop-down list.

**Skin:** TurnTool color theme for the html. You can choose from installed TurnTool skins in the drop-down list.

**Title:** Title of the TurnTool project you are exporting.

**Describe:** (Optional) additional text description of the project you are exporting.

## **Illumination:**

**Static:** Lighting is calculated once when the scene loads. This has the benefit of much better performance. Drawbacks are slightly longer loading time and lighting may look wrong if an object is moved. It is ideal for large static scenes.

**Dynamic:** Lighting is calculated dynamically when viewing the scene. This allows lights and objects to move relative to each other.

**Export Sun:** Export ArchiCAD sun object as a light source.

**Export Lamps:** Export ArchiCAD lamp objects as a light sources.

**Camera Lamp:** Generate and export a light linked to a camera.

## **Options:**

**Double Sided:** Export all geometry as double-sided. This ensures that geometry will be visible and lit properly even if the surface normal vectors are pointing in the wrong direction.

**AntiAlias:** If checked, the scene will be rendered using the real time antialiasing capabilities of the video hardware. This is not supported by all graphics cards.

### **Optimization:**

Combo box allows you to select how you want TurnTool to optimize the scene when exporting. Possible selections are:

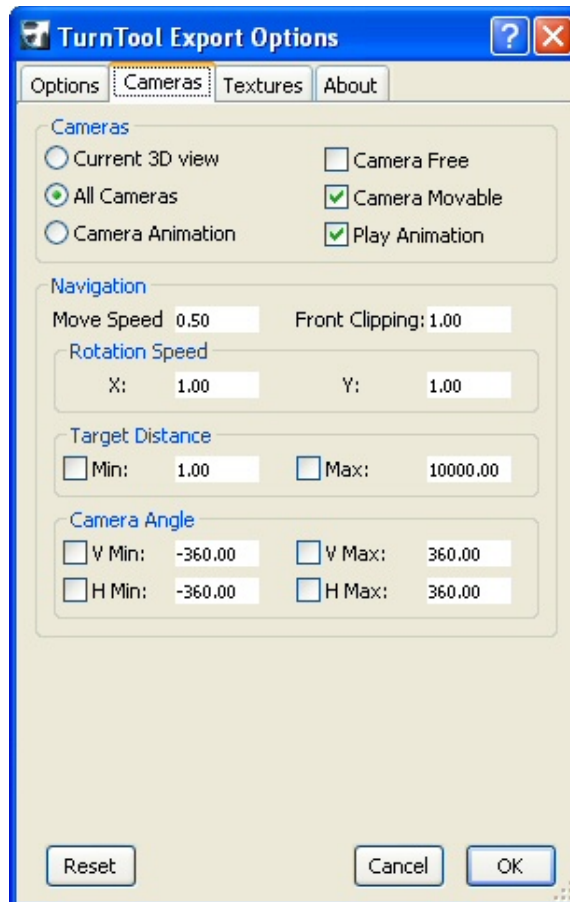
- *Normal Use:* Gives a good all-round optimization of the exported file.
- *Fast Export Time:* Gives a faster export times at the cost of larger file sizes. This is useful when viewing work in progress, but is not recommended for final exports.
- *Extra Small File Size:* Like "Normal Use", but optimizes the file size even more and gives better performance. Exports take longer time though.
- *Extra Fast on GeForce1 & 2:* Like "Extra Small File Size", but optimizes the scene for better performance on platforms with GeForce and GeForce 2 graphics cards.
- *Extra Fast on GeForce3+:* Like "Extra Small File Size", but optimizes the scene for better performance on platforms with GeForce3 and GeForce4 graphics cards.

### **Unit Size:**

Combo box allows you to select what units will be used internally by TurnTool. This has a significant impact on camera clipping planes as front clipping plane has to be positioned in distance bigger or equal to 1 unit. Thus in case of using meters objects closer to camera than 1 meter will be clipped out.

## **5.2.Cameras Tab**

The properties in this tab are used to control the behavior of the selected cameras.



### Cameras:

- **Current 3D View:** Only a single camera representing the active ArchiCAD's 3D view is exported.
- **All Cameras:** Export all cameras in the active camera path individually. User will be able to switch between the cameras interactively when viewing the resulting TurnTool content.
- **Camera Animation:** Export the active camera path as a camera animation. If no camera path is active or there are no camera in the path active 3D view camera is exported. Consult ArchiCAD manual for details on creating camera animation path.

**Camera Free:** When checked, cameras are not restricted by the camera target and they can move freely across the scene ("walk" like navigation). If unchecked, cameras are restricted by the camera target and thus user can navigate around the target only ("explore" like navigation).

**Camera Movable:** When checked, cameras can be manipulated by the user – user can navigate in the scene.

**Play Animation:** Camera animation (if any) will be played in Web browser automatically when TurnTool content is loaded. Note that if you disable this

checkbox user will still be able to play the animation manually using script command.

**Move Speed:** Number describing the move speed of free cameras and the panning speed of target cameras. Negative values reverse the direction of movement as well.

**Front Clipping:** The distance of a front clipping plane from the camera. Objects closer to the camera will be clipped off. Note that the minimal distance for front clipping plane is 1.

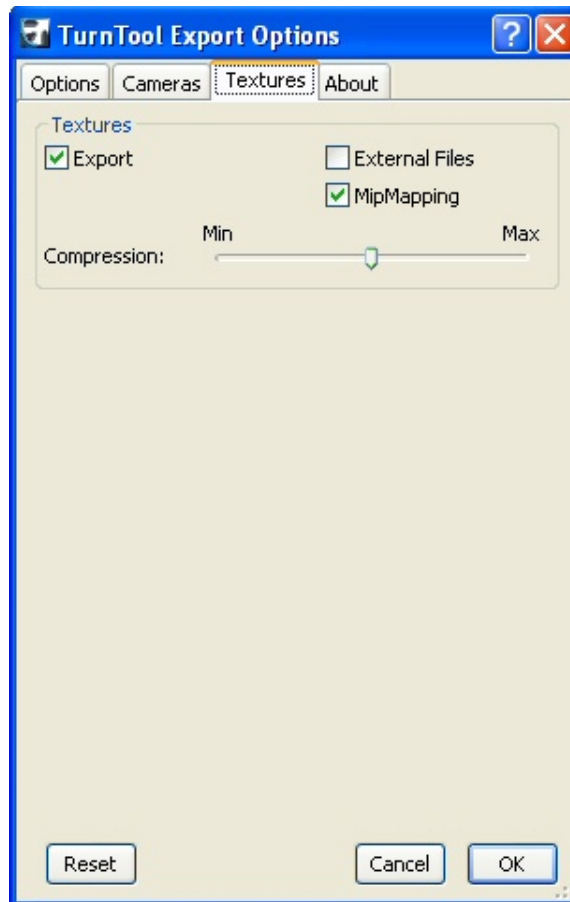
**Rotation Speed:** Number describing the speed with which the camera rotates when moving the mouse pointer. Negative values reverse the direction of movement as well.

**Target Distance:** These values can be used for restricting the distance from the camera to its target point, by setting a minimum and/or maximum distance. The distance needs to be set in meters.

**Camera Angle:** These values can be used for restricting the angle of rotation a camera can attain in the four directions respectively, measured in degrees.

### ***5.3.Textures Tab***

The textures tab is used for configuring TurnTool related properties of textures.



**Export:** When checked, textures presented in the project are exported. If unchecked, textures are not exported resulting in smaller TNT file..

**External Files:** When checked, the textures are not included in the TNT file. This is useful for textures meant to be loaded at runtime by the script.

**Mipmapping:** When checked, the selected textures will use an advanced rendering technique called mipmapping. Briefly explained, this means that textures use multiple levels of detail. This can improve both performance and rendering quality, the expense being an increase in the usage of video memory (33% increase). Best used with high detail textures that are seen from both near and far distances.

**Compression:** Use the slider to set the level of wavelet compression. The higher the compression, the smaller the file size and the lower the quality and vice versa.

NOTE: The level of compression does not change the amount of video memory consumed by a texture. The dimensions of the image alone determine this.

#### **5.4.About Tab**

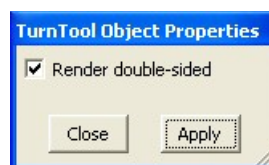
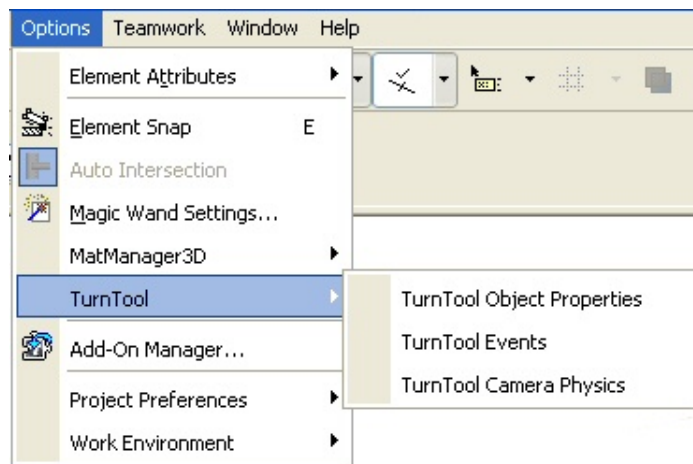
The about tab displays the information on the current TurnToolBox version.



## 6.Object Properties

Objects in ArchiCAD (especially GDL objects) might not have the proper orientation of the vertices in the face – this results in faces which appear to be back-facing (facing away from the viewer) even though they are not. Such faces are handled properly by ArchiCAD but TurnTool cannot handle them efficiently (back-facing faces are ignored by TurnTool viewer to speed up the rendering). In order to fix this problem you can set double-sided rendering property on individual ArchiCAD objects.

To assign double-sided flag to individual objects use TurnTool Object Properties panel. You can open it in Floor plan view from ArchiCAD menu – Tools/TurnTool/TurnTool Object Properties. Note that the panel is visible only if geometry is selected in ArchiCAD's floor plan view.



**Render double-sided:** if enabled object is exported as double-sided thus correcting the problems of back facing faces in TurnTool View.

## 7. Physics

ArchiCAD camera can be connected to a "physics sphere". Sphere movement will be governed by the rules of physics (gravity force, collision) and camera will follow the movement. The physics sphere will be positioned below the actual camera (e.g. sphere touching the ground with camera positioned at the height of the human eyes).

To assign Physics parameters to a camera use TurnTool Physics panel. You can open it in Floor plan view from ArchiCAD menu – Tools/TurnTool/TurnTool Camera Physics. Note that the panel is visible only if a camera is selected in ArchiCAD's floor plan view.

Parameter	Value
Physics Enabled	<input checked="" type="checkbox"/>
Move Free	<input checked="" type="checkbox"/>
Camera Height:	1.5000
Sphere Radius:	0.2500
Move Speed:	400.0000
Gravity:	300.0000
Friction:	0.4500
Mass:	1.0000
Bounce:	0.0100
Air Resistance:	1.0000
Grip Threshold:	70.0000
Grip Face Angle:	1.0000
Angle To Face:	0.0000
Angle To Grip:	0.0000
Jump Force:	350.0000
Jump Scalar:	60.0000
Jump Delay:	500.0000
Air Control Factor:	0.1000
Jump Enable Angle:	0.0000
Move Enable Angle:	0.0000
Border Size:	0.2000
Cache Factor:	2.0000
Rotate Max Speed:	0.0100
Rotate Quadratic:	0.0500
Rotate Linear:	0.1000
Rotate Damping:	1.0000

**Physics enabled:** is physics enabled for selected camera?

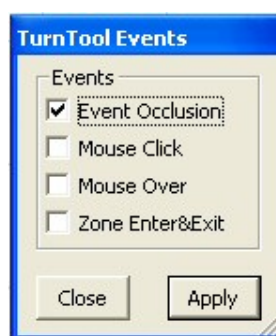
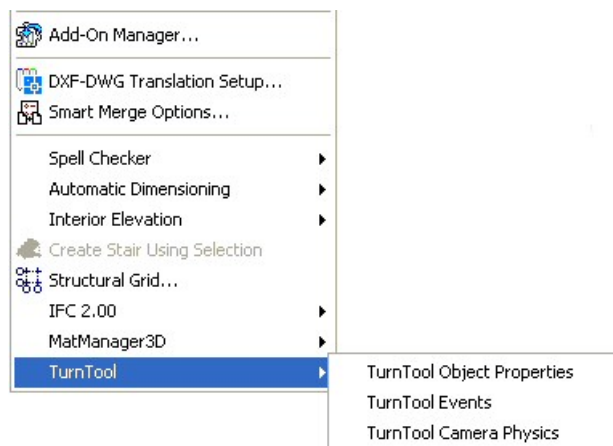
**Move Free:** used for switching on vertical turning (looking up/down).

- Camera Height:** sets the height of the camera above the ground (physics sphere is positioned by height units below the camera)
- Sphere Radius:** sets the radius of the physics sphere
- Gravity:** describes how much gravity affects the object. The higher this number is, the higher the gravity.
- Friction:** sets the object's ability to slide on other surfaces. The higher this value is, the higher the friction.
- Mass:** describes how heavy the object is. The higher this number is, the harder the object is to move.
- Bounce:** describes how much the object will bounce when hitting a collidable object.
- Air Resistance:** describes how much the air will slow the object. The lower this number, the denser the air.
- Grip Threshold:** sets the minimum speed before the object is considered stationary and stops moving. A 'Surface Grip Threshold' value at 10% of the 'Move Speed' value will be suitable in most cases.
- Grip Face Angle:** describes how steep a surface the object can rest on without sliding.
- Angle To Face:** describes how sloped surfaces and walls affect the friction. Setting this value to 0.0 will give you the same friction on all surfaces regardless of the angle to the gravity vector. A value that is higher than 0.0 will make it more difficult to move in any direction on this surface.
- Angle To Grip:** describes how steep a surface the object can rest on without sliding.
- Jump Force:** describes how high the object can jump.
- Jump Scalar:** describes how much the movement speed affects the jump of an object.
- Jump Delay:** sets the minimum time interval between two jumps.
- Air Control Factor:** describes how much control the object has while in the air. A value of 1 gives the same control as on the ground (it can be higher).
- Jump Enable Angle:** describes from how steep a surface the object can jump
- Move Enable Angle:** describes how steep a surface the object can ascend.
- Border Size:** describes how near a physics object have to be to collision geometry before "colliding". Setting this too low may cause problems. Too high values look wrong.
- Cache Factor:** sets the caching radius for collision geometry. Units are the radius of the physics sphere, considering border size.
- Rotate Max Speed:** sets the maximum rotation speed an object can attain.
- Rotate Quadratic:** sets a coefficient for a part of the equation, which describes rotation acceleration and deceleration
- Rotate Linear:** sets a coefficient for a part of the equation, which describes rotation acceleration and deceleration
- Rotate Damping:** describes how fast rotation ceases when input stops.

## 8.Events

Objects can be configured to trigger events when certain situations occur. These events can be handled by the container or script, and appropriate actions can be taken. In other words when a certain situation occur TurnTool can be configured e.g. to call a JavaScript function in your HTML file. With this function you can do what ever you want to do when this event occur. These events are what make the 3D scene truly interactive. A description of how to use these events can be found in the TurnToolBox Scripting Manual, chapter 2.2: "Scripting the TurnTool Control - TNT Event".

To assign events to individual objects use TurnTool Controller panel. You can open it in Floor plan view from ArchiCAD menu – Tools/TurnTool/TurnTool Events. Note that the panel is visible only if geometry is selected in ArchiCAD's floor plan view.



**Event occlusion:** if enabled object can generate events

**Mouse Click:** If checked, the selected objects will generate "OnClick" events. The cursor will change when pointed at these objects and an "OnClick" event will be generated if the user clicks it.

**Mouse Over:** If checked, the selected objects will generate "OnMouseEnter" events when the mouse cursor moves over the objects, and "OnMouseExit" events when the cursor moves away again.

**Zone Enter&Exit:** If checked, the selected objects will generate "OnZoneEnter" events when the center of a physics object enters within their radius, and "OnZoneExit" events when the physics object completely leaves again.

## 9. Troubleshooting

When working with complex constructions, scripting and advanced interactivity, it can sometimes be hard to find out why the scene you have put so much work into, doesn't work.

To help you "debug" your scene, you can press "SHIFT + F1" when viewing it. This brings up an overview of hotkeys available for debugging and profiling.

Note: Make sure the TurnTool control has the input focus when using the hotkeys.

The text screens are only available when using the DirectX renderer (this is the default). If for some reason you are using the OpenGL renderer, you will not be able to see the text, the other functions are still available though.

