

GENESYS III

"LIGHTING SOFTWARE FOR THE LIGHTING PROFESSIONAL"

ORIENTATION GUIDE



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www.genesysiii.com



Empowering Success

Rev 2.0

Welcome

Dear Attendee:

Thank you for participating in this Genesys III Orientation Seminar. This is an exciting time for us. It is a time where we get to personally meet the users of the software. It is a time of learning - both for you and for us. For us, it is the opportunity to look over your shoulder, to learn what your likes and dislikes are in the program, and to learn the way in which you use the program to solve lighting problems. As we look to the future and develop the next versions of the software, this information is invaluable. For you, our hopes are that you will learn how to operate Genesys III more efficiently, to take advantage of its power and flexibility, and possibly learn new ways to help your clients.

Please take advantage of this time to ask as many questions as you'd like. In addition, we always welcome any suggestions you might have concerning the features and direction of Genesys III.

Thank you again for your time.

Sincerely,

Genesys III Orientation Team

Technical Support

For technical support:

Web Site: www.genesysiii.com

Or

Monday through Friday, 9 a.m. to 4 p.m. (EST)

Phone: Toll Free (800) 268-4363

When you email or call be sure to have a detailed description of your problem.



Empowering Success

TRAINING GUIDE

Probably the best way to learn GENESYS III is to use it on typical lighting projects. In this orientation guide you can follow along as we create an indoor and outdoor lighting projects. These self-guided tutorials will offer a hands-on approach to learning the most commonly used features of GENESYS III.

The Projects

The tutorial is divided into five separate sections. Any of these sections can be completed apart from one another. They are as follows:

Section 1: School Gymnasium **Pg: 3**

The section consists of an interior gymnasium with a peak ceiling, bleachers and a basketball court. No CAD drawing is required for this section.

Section 2: Classroom **Pg: 10**

This section consists of a classroom with a sloped ceiling, direct-indirect luminaires, desks, chairs and windows. No CAD drawing is required for this section.

Section 3: Office **Pg: 21**

This section demonstrates how to import a CAD file and construct a 3D rooms, partitions and adding luminaires.

Section 4: Auditorium **Pg: 24**

This section demonstrates how to import a CAD file and construct a 3D room from the 2D lines. A CAD drawing is supplied for this section.

Section 5: Parking Lot (Standard) **Pg: 29**

This section demonstrates importing an exterior CAD file and replacing existing blocks with new fixtures. A CAD drawing is supplied for this section.

Section 6: Parking Lot (Intermediate) **Pg: 32**

This section demonstrates importing an exterior CAD file and replacing existing blocks with new fixtures. A CAD drawing is supplied for this section.

Section 7: Hotel Indoor Swimming Pool (Advanced) **Pg: 34**

This very advanced section guides you through the construction of a hotel swimming pool from scratch. From creating the floor plan to creating the ceiling structure and even a recessed pool with full 3D textures and rendering start to finish. No CAD drawing is supplied for this section.

Extras

Photometric Formats Supported **Pg: 44**

Available Commands – Sorted Alphabetically **Pg: 45**

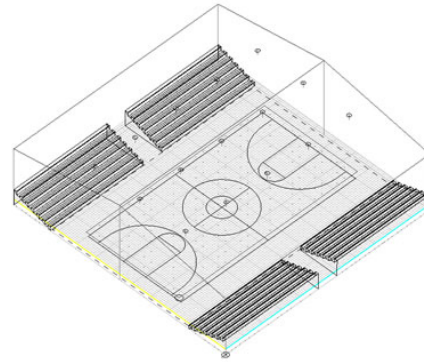
Available Commands – Sorted Topically **Pg: 47**



Project #1: School Gymnasium

Description: School Gymnasium with Basketball court

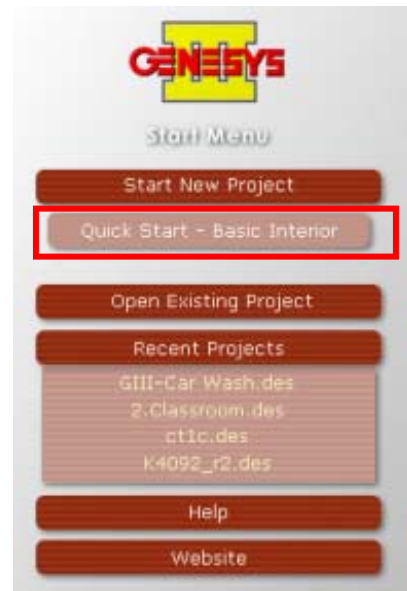
Major Features: Quick Start Interior
Object Placement
Basic CAD
Illuminance Calculations
Introduction to Materials



Lighting: High Bay

For this project, we'll create the room geometry using the Quick Start Interior screen. Start GENESYS III, via Start->Programs->GENESYS III->Launch GENESYS.

On the Start Menu, click the Quick Start Interior button. This brings up the Quick Start screen that allows you to generate room geometry, calculation grid, and (optionally) a lighting system that meets a required light level in the room. *All in one step.* For a significant number of interior design projects, this screen may be all you need to get the project done.



Room Properties

Once the Quick Start screen is loaded, we need to enter the appropriate information. Let's rename the room to **Gymnasium**.

Configuration:

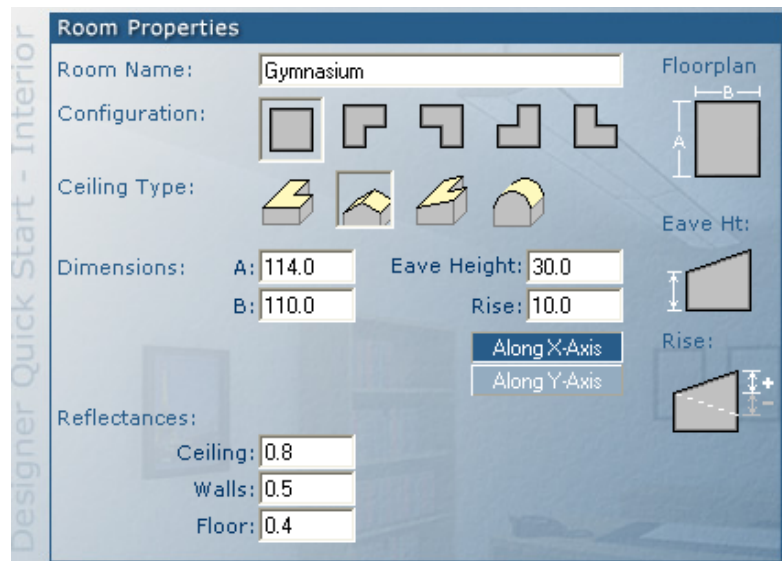
Rectangular (this is the room shape)

Ceiling Type: **Gabled**
(along X-axis)

Size: **110'** by **114'**

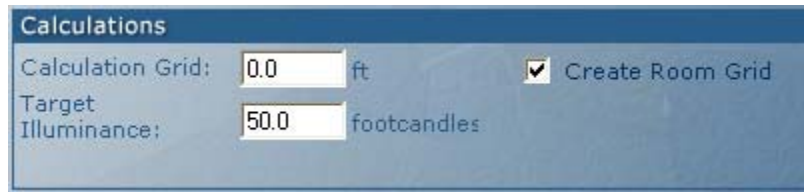
Roof: **30'** with **10'** rise

Reflectances:
Ceiling = 80%
Walls = 50%
Floors = 40%



Calculation Grid

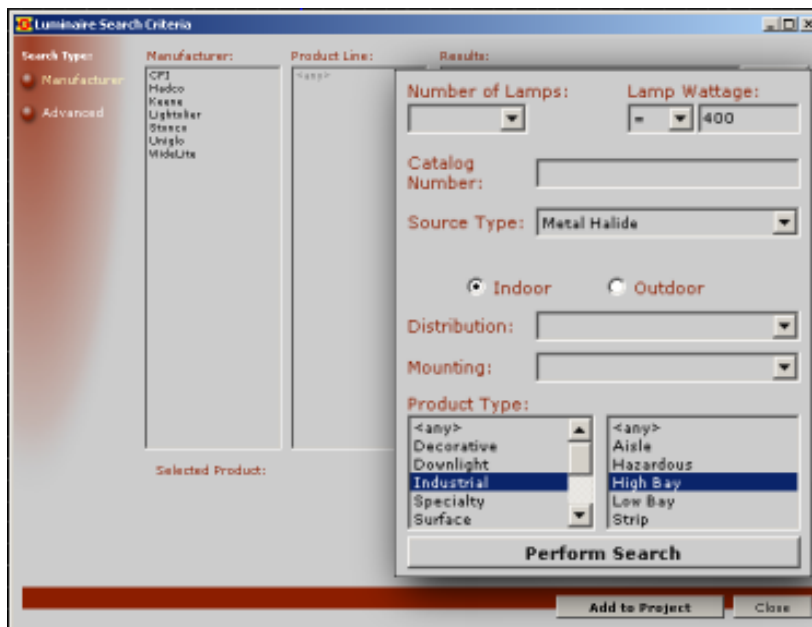
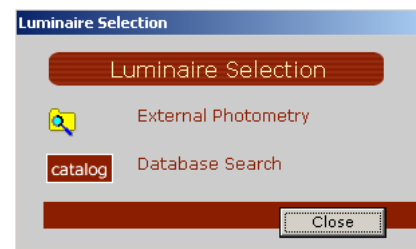
For the gym, we'll need our workplane height (calculation grid) to be on the floor. Thus, change the calculation grid height to be **0'**. For our target illuminance (light level), let's enter **50** footcandles. Make sure that **Create Room Grid** is checked.



Lighting

Under the Lighting section, we'll specify the lighting fixture type that we'd like to use in this room. Click the **Add** button.

On the next screen, you'll be able to browse your computer for photometric files (e.g. IES files) or access GENESYS III's Lighting Libraries. Click on the Catalog icon to perform a database search on the current GENESYS III library.



We need to select a high bay fixture type.

Unless you know a given manufacturer's products well enough, you might try using the Advanced Search. Click on **Advanced**.

Enter the criteria:
Wattage= 400W
Source= Metal Halide
Product Type= Industrial High Bay

Perform the search and select: **Keene Softbay SBLP400MA**. Click **Add to Project**.

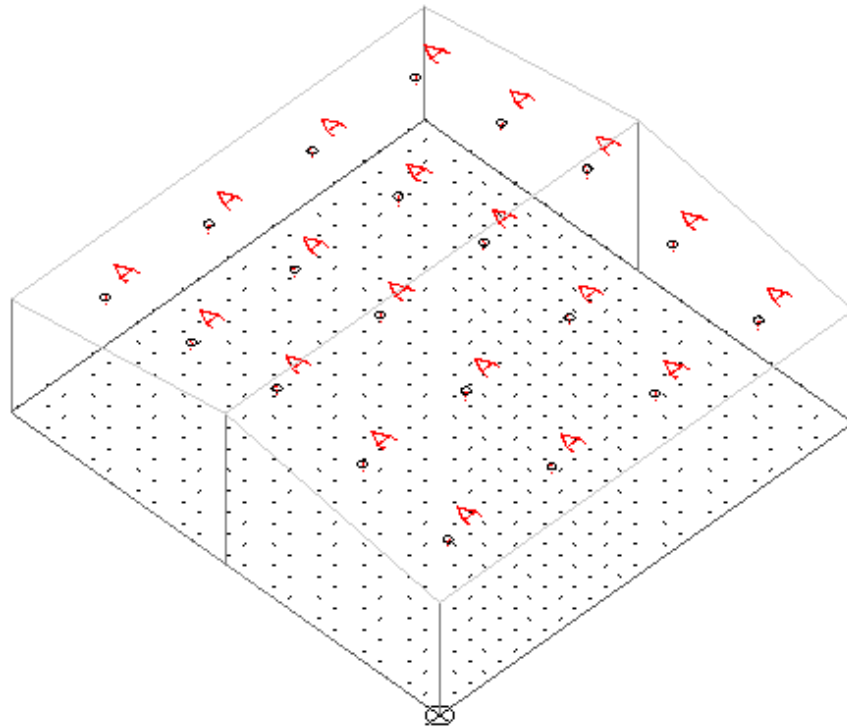
Luminaire Type Properties

The Type screen will appear. This allows you to edit the Type ID (this goes in your lighting schedule), the Light Loss Factor (LLF), Lamp Lumens, Symbol, etc. Make sure you review the Light Loss Factor – this changes for almost every application. Click the ... button to view the common factors that go into creating the correct light loss factor. Note: The light output is diminished by this factor to account for maintained light levels vs initial light level (new lamps, new fixture, everything very clean, etc). For this application, we'll use **0.75** as our LLF. In most situations, you can use the Auto ID to specify the ID. Click **Auto ID**.

The new luminaire type will be loaded into the lighting section. Note that the Mounting (Z-Adjustment) was automatically selected to be **Suspended 1.5'**. GENESYS III saw that this fixture has some up-light component; therefore, it assumed that you'd like it suspended (rather than recessed into the ceiling). Click the Z-Adjustment icon to review the different mounting mechanisms within GENESYS III. For this case, change it to a **3' Suspension**.

We're now ready to create the room, the grid, and the lighting in one step. Click the **Create Room & Lighting** button.

Your Gymnasium should now be created. See the view below:



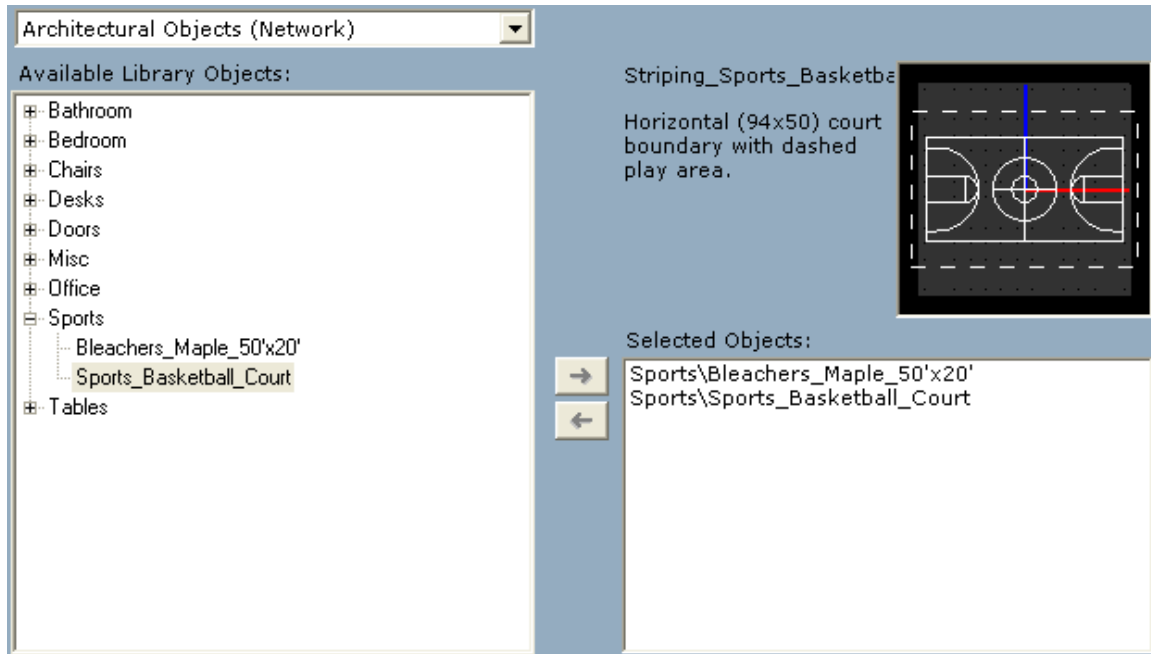
You may need to alter the Calculation Grid spacing. To do so, you can click on a grid point and edit its properties on the lower right hand part of the screen. Let's change the spacing to be every **5'** in both directions. The offset (known grid point from the origin) can be **2.5'** by **2.5'**.

Grid Gymnasium	
General	
Name	Gymnasium
Layer	Grid
Display Color	■ By Layer
Line Type	By Layer
Line Width	By Parent
Calculations	
Calc Active	Active
Geometry	
Origin X	0.00
Origin Y	0.00
Origin Z	0.00
Orientation	0.00
Grid	
Spacing X	2.00
Spacing Y	2.00
Offset X	1.00
Offset Y	1.00
Num Pts	3135
Display	

Grid	
Spacing X	5.00
Spacing Y	5.00
Offset X	2.50
Offset Y	2.50
Num Pts	506

Objects

We're now ready to add the basketball court and bleachers to the gym. Switch to plan view and access the **Object Library**. This can be done via the Shortcut Menu or the Object tab.



Navigate to the Sports folder and select the **Sports_Basketball_Court** object. You'll note the preview at the right. Click the arrow button to add this object to your palette of Selected Objects. Repeat this process for the **Bleachers**.

On the Object tab (upper right, 4th tab down), make sure that the Court is selected and click the Add button.

Drop the court in the center of the space (**55, 57**).

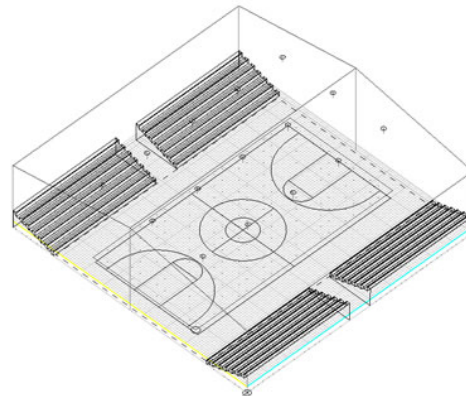
Now, drop a bleacher in at **2,1** (lower left corner) and at **58,1** (lower right corner).



We can now use the **Mirror** function to create the bleachers on the opposite side. Make sure to specify your mirror line across the middle of the room. Note: you might use the OSnap feature in CAD to make this more precise and allow you to just click to points across the center of the court.

How does your gym look?

Save your project.



Masking

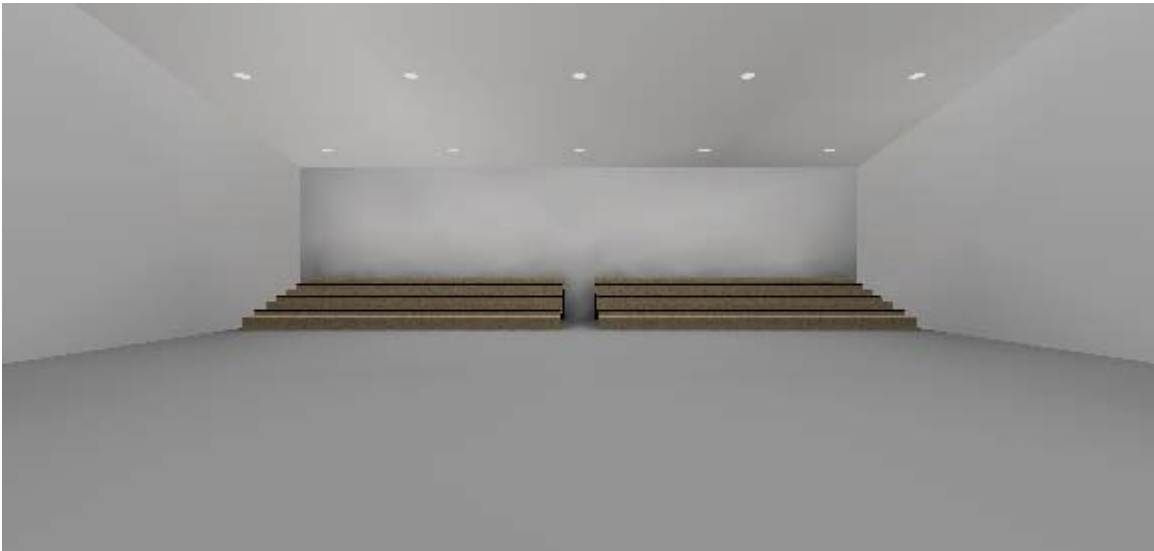
One last change before we run calculations. We now have many calculation points that are beneath our bleachers. These are going to have a negative effect on our statistics (average, etc). Thus, we need to mask these points. Make sure you are in a **Plan/top view** and **OSnap** is **not on**. Click on the **Grid tab** and click on the **mask rectangular** (inside). Follow the instructions to mask the points. You should window the areas below the bleachers.

We're now ready to do a quick calculation to see how we're doing. Under the **Calculate menu**, click on the **Calculation Manager**. Select the **Fast Basic** calculation template and click **Run Calculations**.

This performs a fast calculation. For your final calculation, you'll use a more detailed calc; however, this allows us to check our model, materials, etc, without having to wait long. This calc usually takes a couple minutes depending on your computer.

Did you get some numbers? Look at your statistical readout at the bottom of the screen.

You can also do a quick rendering to check out your model so far...



Extra Credit: Materials

Use the Material Manager to select a material for the floor and walls. Add these to your material palette (drag the material to the upper right section). Then assign these new materials to the proper layers via the Layer Manager.

Run the calculations again.



Project #2: School Classroom

Description:	Classroom
Major Features:	Sloped Roof Daylighting Basic CAD Illuminance Introduction to Materials
Lighting:	Direct / Indirect plus Daylighting







For this project, we'll use the Room Wizard to create the room geometry and grid (rather than the Quick Start). Although this particular room could easily be created using the Quick Start, it's important to learn this alternative method as it does allow for even more advanced geometry – which we'll need for other projects.

Room Wizard

Start GENESYS III and a New Project. Locate the GENESYS Shortcut Menu in the upper right.



1. Click  in the Tools Window.
2. Click **Create Area** on the Shortcut Menu.
3. Click **Room**.
4. Name room **Classroom**.
5. Click **Next** or press ENTER.
6. Click **Rectangular**.
7. Click **Enter**.
8. Type **32** in the field provided for the X dimension.
9. Click **Next**.
10. Click **Next** again to accept the default Y dimension of 30'.
11. Click  for the Slope Ceiling option.
12. Click  to slope along the Y axis.
13. Type **12** for the eave height.
14. Click **Next**
15. Type **-4** for the vertical rise/fall. *Note that a negative value is acceptable.*
16. Click **Next**.
17. Click **Assign Reflectances**
18. Click **Default** for the ceiling reflectance.
19. Click  next to the Refl. (reflectance field for the walls).
 - ◆ Review the Color Editor

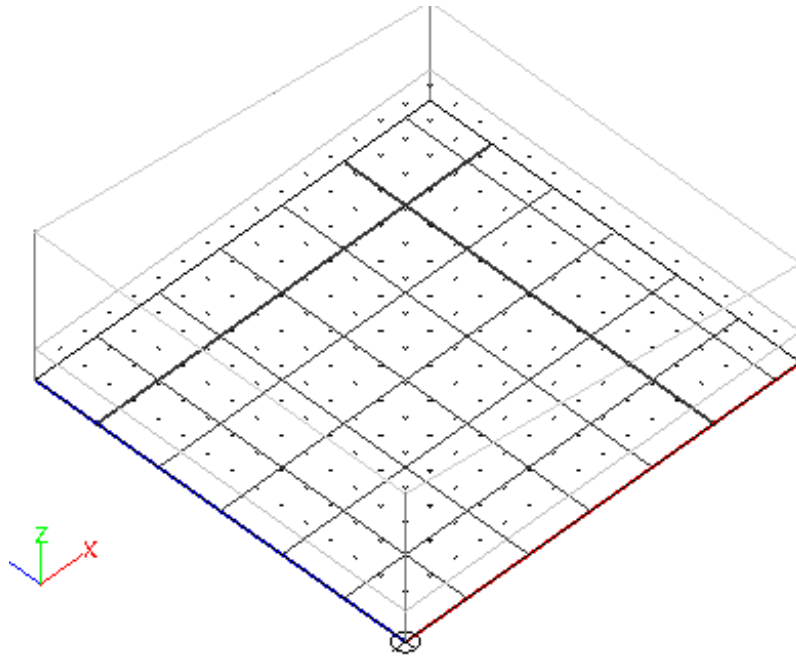
20. In the Color Editor, click in the Spectrum pane and drag until there you see a tan color you like in the Color|Solid pane. *Note: You can add the color to your custom palette.*
21. Click **OK**.
22. Type **.50** in the Refl. field for the walls.
23. Click **Next**.
24. Type **.2** in the Refl. field for the floor.
25. Click **Next**.
26. Click **Create Grid**.
27. Press **ENTER** to accept the default of 2.5 in the Workplane Height field.
28. Click **Next**. The Plan (top) View of your room will appear in the CAD window.

You may need to alter the Calculation Grid spacing. To do so, you can click on a grid point and edit its properties on the lower right hand part of the screen. Let's change the spacing to be every **2'** in both directions. The offset (known grid point from the origin) can be **1'** by **1'**.

Grid Classroom	
General	
Name	Classroom
Layer	Grid
Display Color	■ By Layer
Line Type	By Layer
Line Width	By Parent
Calculations	
Calc Active	Active
Geometry	
Origin X	0.00
Origin Y	0.00
Origin Z	2.50
Orientation	0.00
Grid	
Spacing X	2.00
Spacing Y	2.00
Offset X	1.00
Offset Y	1.00
Num Pts	240
Display	
Displayed Metric	(M) ILL: 0,0 (Hor...
Display Precisi...	0
Display Points	Yes




Grid	
Spacing X	2.00
Spacing Y	2.00
Offset X	1.00
Offset Y	1.00
Num Pts	240

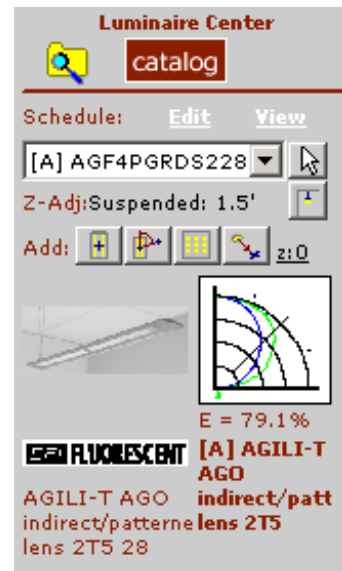
Your Classroom should now be created. See the view below:



Luminaires


Time to select and add the luminaire type we want to use for this space. In this case, we'll select a direct/indirect luminaire from the product catalog.

1. Click  to open the Luminaire Center then  to add a luminaire.
2. Click **Manufacturer** search method.
3. Set search criteria to:
4. **Manufacturer=CFI**
5. **Product Line=Agili-T**
6. Select the 4' Direct/Indirect: **AGL4PGRDS228PG** (first AGL on the list)
7. Add this luminaire to your project, **LLF=0.80** and name it by selecting **Auto ID**.
8. Click  to open the Luminaire Z-Adjustment Editor.
9. Click **Ceiling Suspended**.
10. Confirm or type **1.5** in the Suspension Length field.
11. Click **Ok**.



Quantity Estimator

Let's make GENESYS III do some work. Specifically, we want to estimate the quantity of luminaires we need:

1. Click  to open the Quantity Estimator.
2. All the room dimensions and reflectances should default otherwise you have to enter them.
3. Type **45** in the Target Illuminance field.

Note that the Quantity Estimator recommends at least **20** of this luminaire type for your model.

Defined Area

Size: X: Y: Z:

Average Reflectances: Ceiling:

Walls:

Floor:

Estimation

AGILI-T AGL direct-Indirect 2T5 28AGL4PGRDS228PG

15 required

The room requires 15 AGILI-T AGL direct-Indirect 2T5 28AGL4PGRDS228PG luminaires to achieve 12.0 fc.

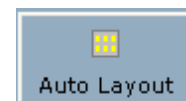
Enter the Target Illuminance:

Suspension Length:

Light Loss Factor:

Workplane Height:


You now have two choices: Auto Layout and Array. Auto Layout creates a simple grid of luminaires within the room as needed. Array gives you more options and control over the arrangement. For this case, let's just click the **Auto Layout** and have GENESYS do the work.

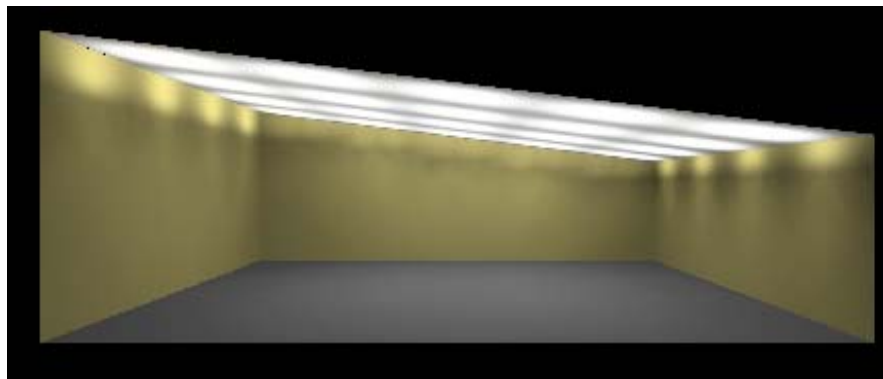


The fixtures have been automatically arranged in the room to meet our requested light level. If you look at the Front Elevation view, you'll see that the fixtures are all suspended from the ceiling at the appropriate position along the sloped ceiling.



Run fast, basic calculations and view the Statistical Summary:

1. Click **Calculate > Calculation Manager**.
 - ◆ Review the Calculation Manager's Settings Templates
2. In the Calculation Manager's Settings Template, click **Fast, basic calcs**.
3. Click **Close**.
4. Click  on the Toolbar to begin quick calculations.
5. When calculations are complete, look at the Statistical Summary window to confirm that the average FC (footcandle) value in the classroom is as expected.
6. Click Calculate > Render > Radiosity. Note the luminous geometry.



- ◆ Review Project Settings

Save your .DES file:



1. Click **File > Save** to open the File Save Browser.
2. In the File name field, type **Classroom**.
3. Click **Save**.

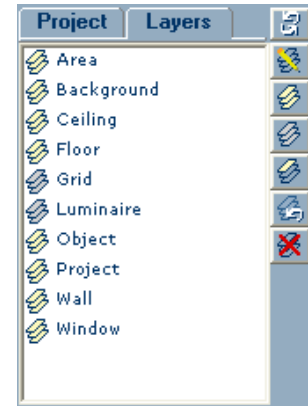
- ◆ Review the CAD view styles

Daylighting





Now that our electric lighting seems to be working, let's add some natural lighting.

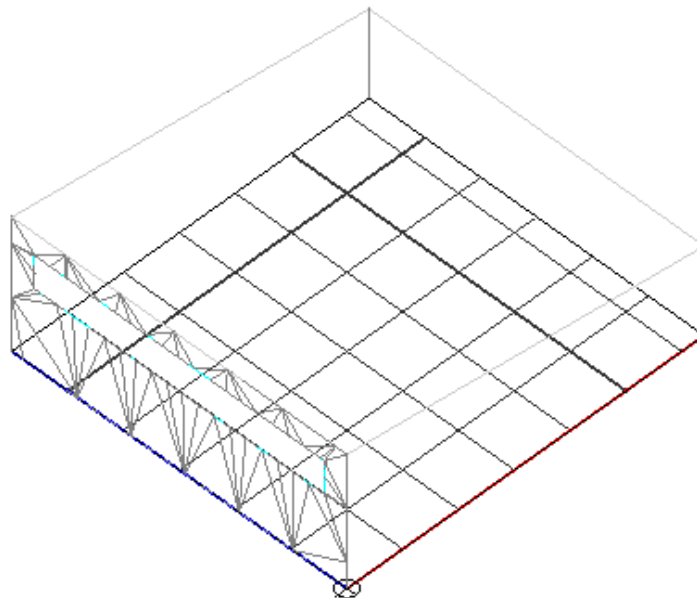
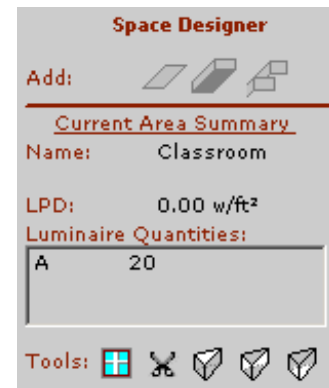
First, let's clean up our view a bit by turning off some layers:

1. Change your view to a wireframe click .
2. Click  to open the Project Explorer.
3. Select the **Layers** tab.
4. Double-click **Grid** and **Luminaire** to turn off the layers.



Now that the view is a bit cleaner, let's add a Window:

1. Select the isometric view. **View > Isometric Views > Southwest.**
2. On the Toolbar, click  to change to a filled CAD view style.
3. Toggle **SNAP** off and OSnap should be off.
4. In the Tools window on the right click  to open the Space Designer.
5. Click  to add a day lighting window.
6. Select the West wall of the classroom.
7. Click  to return to a wireframe CAD view style. Note that the cplane grid is now on the wall.
8. Click on the four points to create the window or type the following coordinates **(2,7)** then **(2,10)** then **(28,10)** then **(28,7)** then **C** for close.
9. If you clicked the four points, right-click to close the window.





Objects

Let's add some 'desks' and chairs for our students. To do so, we need to build our Object Palette:

1. In the Tools window click  to open the Object Designer.
2. Click  to open the Architectural Object Browser.
3. Click + next to **Chairs** to expand the folder.
4. Click **Chair_Swivel**.
5. Click  to add the chair to the Selected Objects list.
6. Click + next to Desks to expand the folder.
7. Click **Desk_Straightleg**.
8. Click .
9. Click + next to **Misc** to expand the folder.
10. Double-click **Plant_Potted_Spiky**.
11. Click **Ok**.

◆ Review Methods for Selecting CAD Entities

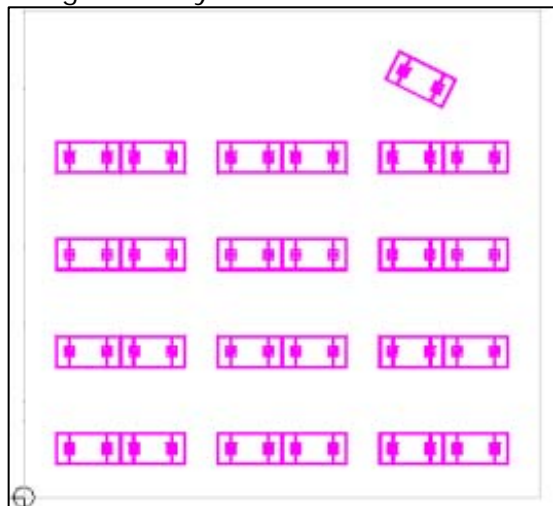
Add desks to the model:

1. In the Object Designer's (Object) Palette, click + next to **Desks**.
2. Click **Desk_Straightleg**.
3. Click  to add these to the room.
4. Move your cursor with the desk into the CAD window.
5. Watch the Coordinate Readout and click at **4,3,0**.
6. Right-click to end the function.
7. Click the desk to select it.
8. Click  to array desks.
9. Type **r** on the Command Line for a rectangular array.
10. Type **4** for number of rows.
11. Type **2** for the number of columns.


12. Type **6** for the row spacing.
13. Type **4** for the column spacing.
14. Select the newly arrayed desks in the CAD window.

◆ Review the copy and move functions

15. Type **copy**.
16. Type **0,0**.
17. Type **10,0**.
18. After the middle set of desks is created, repeat the last copy using them to create a third set of desks.
19. Add the instructor's desk using the Add & Rotate button (for this, you'll click to drop and then click to define the rotation of the desk).



Add chairs to the model:

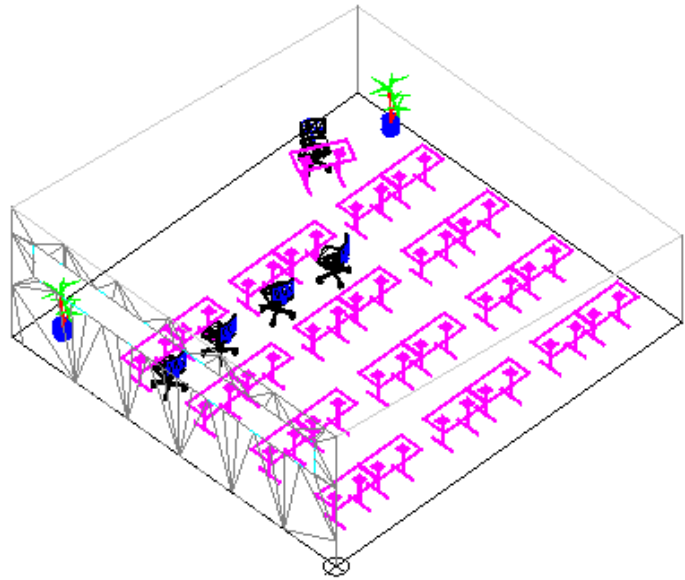
1. Toggle **SNAP** off.
2. Click + next to **Chairs** in the (Object) Palette.
3. Click **Chair_Swivel**.
4. Click  to add multiple with orientation.
5. Move your cursor with the chair into the CAD window.
6. Click behind one of the desks.
7. Rotate the orientation line so that the chair faces the direction you want.
8. Click again to finish the orientation step.
9. Repeat steps 6-8 above to add and orient a chair to other desks. (the more objects you add, the longer your calculations will be)
10. Right-click or press **ENTER** to end the function.

Save your file with a new name:





1. Click **File > Save As**.
2. Type a new name in the File name field.
3. Click **Save**.

Extra Credit: Add the Plant and Define Materials

1. Select **Plant_Potted_Spiky** from the Object Palette.
2. Click **Add > Architectural Object > Multiple Add with Orientation**.
3. In the CAD window, click near **31,26,0** (or anywhere you want to add a plant), rotate to orient the plant and click again
4. Right-click to end the command. (If you want, drop a few plants outside the window and use the scale function to multiple their size by 2 – 2.5 times)




Apply a material to the ceiling:

1. Click  to open the Material Manager.
2. Open the **Pre-defined > Ceilings > 2'x2' Suspended Ceiling**.
3. Drag it right, onto the Material Palette.
4. Click  to close out of the Material Manager.
5. Click  to open the Layer Manager.
6. Click in the ceiling layer's Layer Material field and select **2'x2' Suspended Ceiling**.
7. Click **Ok**.
8. Turn the **Grid** and **Luminaire** layers back on in the Project Explorer's  > Layer Listing.



Extra Credit: Physical Geometry

Adding physical luminaire geometry:


1. Click .
2. Click **Edit**.
3. Select the **AGILI-T** luminaire.
4. In the Luminaire Type Editor's main pane, click in the **Display|CAD Geometry** field.
5. Select **Physical**.
6. Click in the **Display|Rendering Geometry** field.
7. Select **Physical**.
8. To the left of the editor's main pane, click **Physical** to open the Luminaire Physical Geometry Manager.
9. Change to the **Local Physical Geometry Library** at the top.
10. Click + next to **Linear**.
11. Click **Finelite S-15 - 8 foot version** for demonstration purposes.
12. Click **Ok**.
13. Click **Close**.

Daylighting Settings

Set daylighting factors and run detailed calculations:

1. Click **Calculate > Calculation Manager**.
2. Choose **Standard calculations** from the Setting Template.
3. Click **Show Advanced Settings**.
4. In the Advanced Settings Editor, scroll down and select **Enable** in the Ambient Source field.
5. Click **Close**.



6. Click .
7. Click **Calculate Daylighting Contribution**.
8. In the Time field, type **3:00 PM** (or some other time in the afternoon).
9. Click **Run Calculations**. **Note:** This could take some time depending on your computing speed




Radiosity – Basic Settings



Raytrace of the above





View the Calculation Grid Results:






1. Once calculations are complete, click .
2. Click **View Grid Results** to open the Grid Results Viewer.
3. In the Available Grids list, click **Classroom**.
4. Note the calculated values at individual points, as well as the average, maximum and minimum values and the ratios between them.
5. Click **Close**.

◆ Review the dynamic viewing and rendering adjustment tools

Set and save a named view for rendering:

1. Click **View > Styles > Show surface orientation**.
2. Click  for a front view. (Or click View > Isometric Views > SE if you put plants outside the window)
3. Click  to change to perspective viewing mode.
4. Click .
5. Click any of the  dynamic viewing tools to set your CAD view to a viewpoint you want to render.
6. Type **viewname**.
7. Type **s**.
8. Type a name for your named view.

Generate a rendering and export an image file:

1. Click  to generate a radiosity rendering.
2. Click .
3. Press **ENTER** to browse for a folder in which to save your image.
4. Type a filename for the image.
5. Click **Save**.
6. Click .

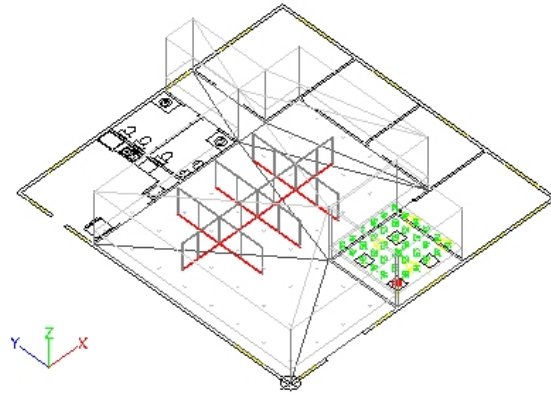
◆ Review the Output Manager

Project #3: Office

Description: Basic importing of a CAD drawing, creating rooms, analysis grids and adding luminaires.

Major Features: DXF/DWG Import
Creating Rooms
Adding Grids & Luminaires

Lighting: Downlighting

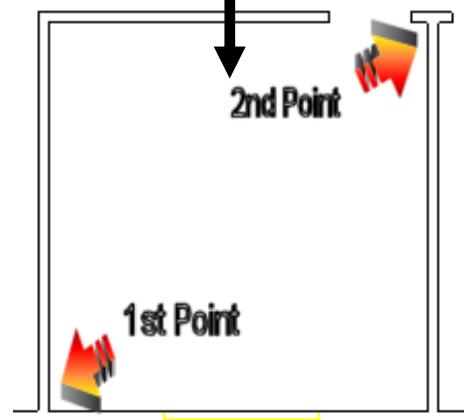
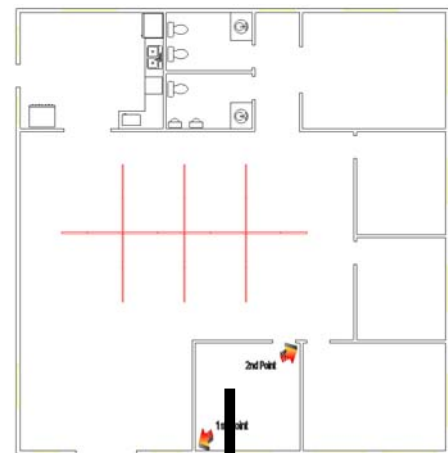


Import CAD drawing:



1. Start a new design.
2. Go to **File/Import/DXFDWG**
3. Select **C:\Program Files\GENESYS\Program\Tutorial\basic_office.dwg**.
4. **Merge** layers.
5. Select **Done** for modify geometry.
6. Specify **INCHES**.
7. Select **FILE ORIGIN** as the geometry's relative placement point.
8. Insert at the Origin by typing **0,0,0**.

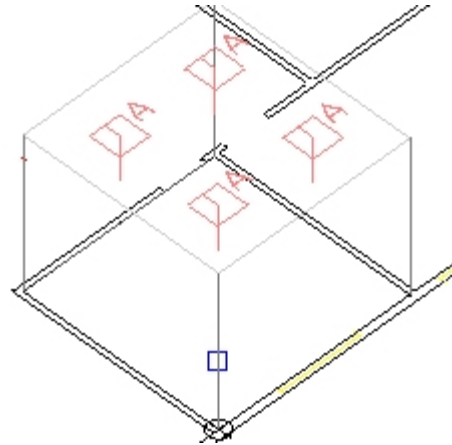
Creating Rooms

1. From the GENESYS Shortcut Menu
2. Select **Create Area>Room**
3. Name the room **Room1**
4. Select **Rectangular** and **Draw**
5. Turn on the **OSNAP** toggle button at the bottom of the screen to allow the selection process to snap to the intersections.
6. Using the mouse pick the two opposite corners of the room (See right).
7. Next, select the **Flat Ceiling Type** and set it to **10'**
8. **Use Defaults** for the reflectances (80/50/30)
9. Click **Create Grid** and use the default **2.5'** height.



Adding Luminaires

1. Go to  > **catalog**.
2. Under **Advanced Search**, choose Catalog Number = **QVS2GPF**
3. Add CFI > **QVS2GPFOS2FTBE** (the one marked "ALTER 2X2 2TT5 50 PERF" in the description).
4. Use the default TYPE ID 'A', Set the LLF to **0.8**, click **OK**
5. Make sure luminaire Z-Adjustment  is set to **Recessed**.
6. Select the Quantity Estimator/Array button and set the estimation section to 50 FC and all the rest should default as per your previous settings.
7. Click Auto Layout and click Yes to keep luminaires at the same height.




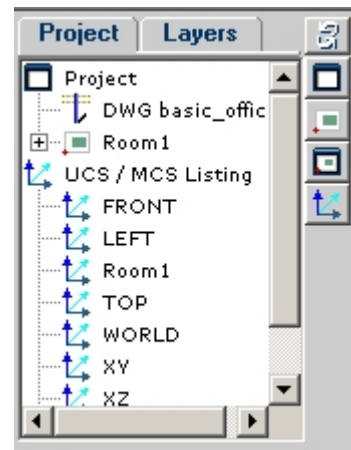
Run Calculations and View Results:

1. Run calculations by going to **CALCULATE>CALCULATION MANAGER** select **Default Template** and then **Run Calculations**.
2. View grid statistics at the bottom of the screen.

Navigating the project


Once the room is created and you want to move to another or even outside the room you can use the Project Navigator.

1. Click on the Project Navigator  then make sure the Project tab is selected.
2. An indented project list is shown. By clicking on the + for Room1 the expanded list of items within the room will be shown (see right). Beside Room1 is also a symbol indicating Current Insert Area. Lets move out to the whole floor plan.
3. Click on Project then the Icon indicating Current Display and Insert Area on the right. Now you are outside the room and can see the whole floor plan.





Creating a Second Room

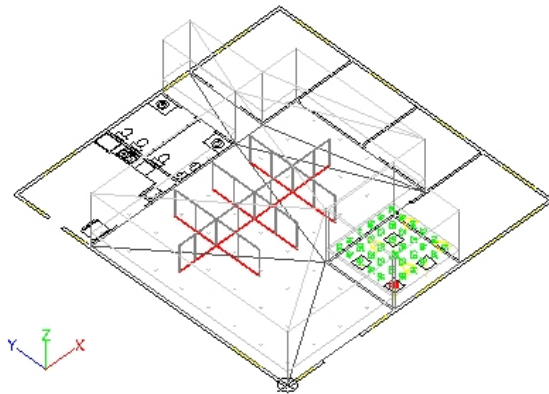
For this room we are going to create the odd shaped main office area.

1. From the GENESYS Shortcut Menu 
2. Select **Create Area>Room**
3. Name the room **Room2**
4. Select **Polygonal** and **Draw**
5. Turn on the **OSNAP** toggle button at the bottom of the screen to allow the selection process to snap to the intersections.
6. Using the mouse pick the lower left corner and work your way around the room in a counter-clockwise direction.. **RIGHT-HAND-RULE: You must go counter-clockwise in order for the light meter to face upward otherwise it will face down.**
7. Next, select the **Flat Ceiling Type** and set it to **10'**
8. **Use Defaults** for the reflectances (80/50/30)
9. Click **Create Grid** and use the default **2.5'** height.

Creating Partitions

Within the current room, Room2 that was just created there are partitions on the CAD Drawing. We can make use of these lines and make them into 3D partitions for calculation purposes.

1. Start by clicking on the Space Designer tab  then select the Add Walls To Room  button.
2. Pick the **Select** button as where are existing lines.
3. Next draw a box from bottom left of upper right, encompassing the partition lines.
4. Once all the lines are selected click Done then Fixed Height.
5. Make them 5' and use the default reflectances.



Adding Luminaires & Calculation (optional)

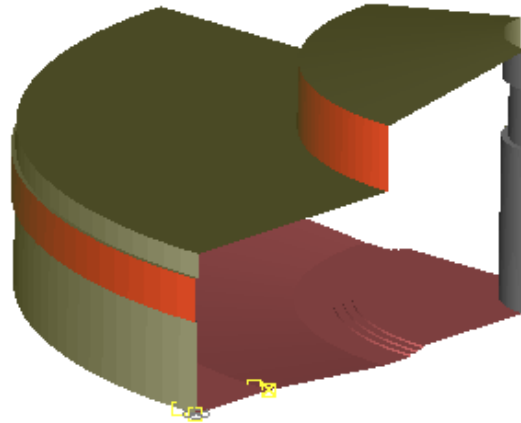
Add luminaires as needed and calculate per instructions prior.

Project #4: Auditorium / Church

Description: Advanced technique for complex geometries (using information supplied via CAD)

Major Features: DXF/DWG Import
Revolved Geometry
Convert to Ceiling,
Wall, and Floor

Lighting: Designer Choice –
example uses
downlighting & natural lighting



Import CAD section of auditorium:

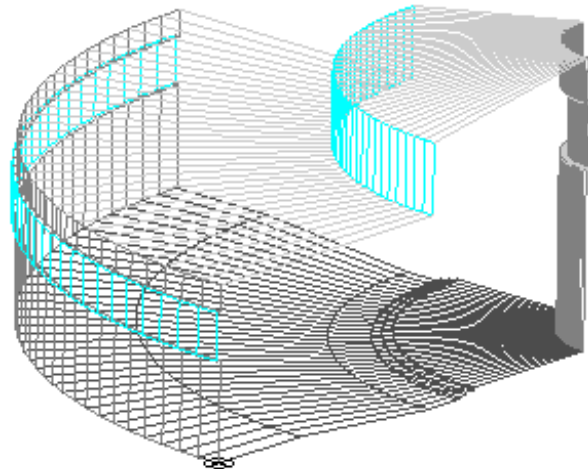
1. Select C:\Program Files\GENESYS III\Program\Tutorial\Auditorium Outline.dwg.
2. **Merge** layers.
3. Select **Done** for modify geometry.
4. Specify **Feet**.
5. Select **FILE ORIGIN** as the geometry's relative placement point.
6. Insert at the Origin by typing **0,0,0**.

Revolve the section outline to create ceiling and floor:


1. Switch to Front View located under the **VIEW>STANDARD VIEWS** drop down menu.
2. Select the polyline outline.
3. Type **REVOLVE** into the command line.
4. Type **O** to select an object.
5. Select the vertical polyline to revolve around and then enter.
6. Type **-90** for angle of revolution.

Orient the mesh and explode:


1. Switch to a Filled CAD View under **VIEW>STYLES**.
2. Select the mesh.
3. Type **ORIENT**.
4. Type **R** for Reverse.
5. Select the mesh again
6. Type **EXPLODE**.



Create the windows:

1. Switch to Front View **VIEW>STANDARD VIEWS** and orbit slightly to the right.
2. Turn off the Background layer  > **Layer Listings**.
3. Select by crossing (right to left selection) the 2 sections of windows and convert each to a mesh by typing **P2M** into the command line (see highlighted items on image above)
4. Select again and move to the Windows layer in the property editor (lower right-hand side).
5. Turn off the Windows layer.

Refine the walls:

1. Select (by crossing) the sections of walls and convert each to a mesh (P2M tool).
2. Select mesh again and convert the mesh to Walls **MODIFY>CONVERT SURFACE TO WALLS**.
3. Select the Walls and move to the Wall layer in the property editor.
4. Turn off the Walls layer  > **Layer Listings**.

Refine the ceilings:



1. Go to **FILE>APPLICATION SETTINGS>CAD**, set Property Limit=400.
2. Select (by crossing) the sections of ceilings and convert each to a mesh (Type P2M).
3. Then convert the mesh to a Ceiling.
4. Select again and move to the Ceiling layer.
5. Turn off the Ceiling layer.

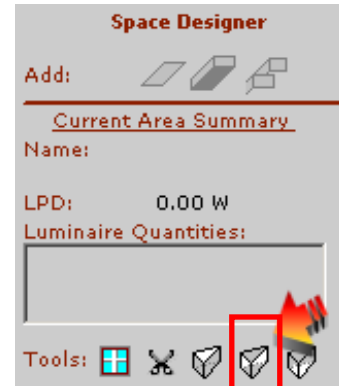
Refine the floor:

1. Select (by crossing) the sections of floors and convert each to a mesh (P2M).
2. Then convert mesh to a Floor.
3. Select again and move to the Floor layer.
4. Turn off the Floor layer.



Add the side walls:

1. Switch to Isometric View.
2. Turn on only the Background layer.
3. Create a 45° angle polyline through the model starting from the base of the existing vertical polyline.
4. Turn on OSNAPS and click at the bottom of the vertical polyline to define the starting point.
5. Then type 22.87,55.21,0 for the second point. Enter again to end the command.
6. Type **POLYGON** and draw a polygon clockwise, osnapping to the imported CAD file.
7. Type **MIRROR** and Mirror the imported pline about this newly created line by selecting it's the two furthest points on the 45 degree line.


8. Create a second **POLYGON** on the mirrored pline.
9. Turn OFF the Background layer and turn ON the Objects layer. This way you will only see the Polygons and not the Polylines.
10. Select both polygons and convert them to Walls by going to the Space Designer  and selecting .
11. Place them on Wall layer.
12. Now turn ON all layers.

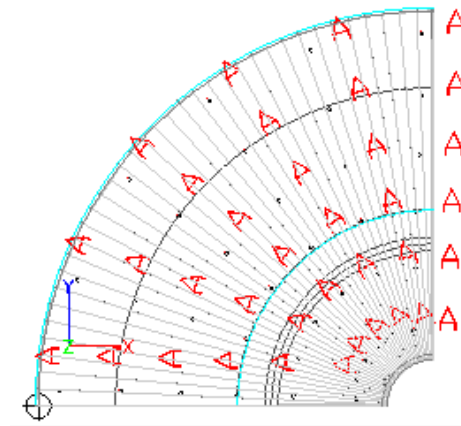


Select a luminaire:

8. Go to  > .
9. Under Advanced Search, choose Wattage = 100, Source = Metal Halide, Product Type = Downlight:Open
10. Add Lightolier : Calculite > **DL6CBK/DL6C10HA** (the first Lightolier Calculite with photometry).
11. Make sure the luminaire Z-Adjustment is set to **Recessed**.

Add Polar Array of luminaires:

1. In a Plan View add  6 luminaires along the lower left, radiating outward.
2. Type **ARRAY** and create a polar array,
3. Add **5 new items**
4. Angle to fill is **-90°**
5. Pick a point on the angled pline between the vertical pline and the curved wall as the center point off the array.



Add a calculation grid:

1. Shift the Cplane up 4 feet type **CPLANE>**
2. Select **Zshift**.
3. Enter **4**.
4. Next, type **GRID** to start creating a polygonal grid around the auditorium.
5. Name the grid **Auditorium**.
6. Type **AREA** as the grid type.
7. **DRAW** the grid in a counter clockwise direction with NO Snap or Osnap.
8. Once complete right click your mouse or Enter to finish.
9. Next change the grid spacing to 5' x 5' centers with a 2' x 2' offset.

Build the Material Palette:


1. Go to **VIEW>MATERIAL MANAGER**.
2. Add Ceilings>Textured Ceiling (85%). Click and drag material from top left quadrant to top right.
3. Add Flooring>Carpet>Carpet Medium Beige.
4. Add Walls>Paints>Smooth>Semi-Gloss>Medium Beige Semi-Gloss and change the color.

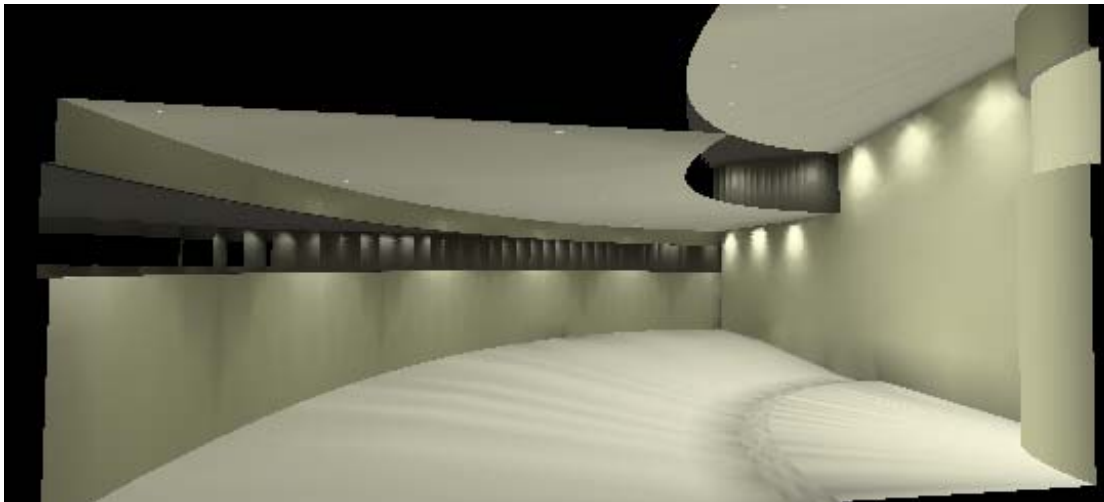
5. Add Glass>Simple Glass.
6. Close Material Manager window.

Set the Layer Materials:



1. Go to **VIEW> LAYER MANAGER**.
2. Set the Wall Layer Material to Medium Beige Semi-Gloss.
3. Set the Ceiling Layer Material.
4. Set the Floor Layer Material.
5. Set Window Layer Material.
6. Close window.

Calculate without daylighting to verify daylighting levels:

1. Press the calculator button from the tool bar.
2. Once calculations are complete, click .
3. Verify the calculations are at the correct by selecting the **View Grid Results** button from the Designer Shortcut Menu.




Add Architectural Objects:

1. Select the **Build Object Palette** button from the Shortcut Menu.
2. Add Chairs>Pew and Misc>Lectern.
3. Select  from the Shortcut Menu.
4. Add the lectern to the stage area, using add and orient button .
5. Move the cplane back down to World by typing **CPLANE** then W for World
6. Add a few pews to the seating area.





Calculate with daylighting:

1. Go to the **CALCULATE> CALCULATION MANAGER**.



2. Select  and turn on daylighting contribution by checking the box.
3. Select **RUN CALCULATIONS** this will take a while.

Create a rendering:

1. Click .
1. Turn on **Perspective** viewing.

2. Click any of the  dynamic viewing tools to set your CAD view to a viewpoint you want to render.
3. Click  to generate a radiosity rendering.



Project #5: Parking Lot

Description: Outdoor Parking Lot

Major Features: DXF/DWG Import
Exterior Lighting
Polygonal Calc Grids
Auto Recalc

Lighting: Parking Lot / Exterior

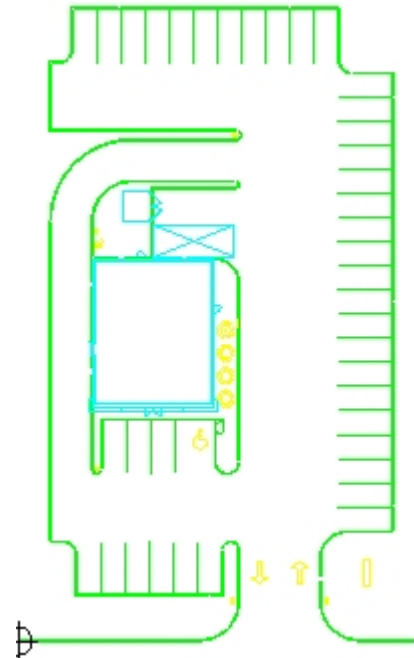
Import a CAD file:

1. Start a new design.
2. Go to **File/Import/DXFDWG**
3. Select **C:\Program Files\GENESYS\Program\Tutorial\Parking - Basic.dwg**.
4. **Merge** layers.
5. Select **Done** for modify geometry.
6. Specify **INCHES**.
7. Select **FILE ORIGIN** as the geometry's relative placement point.
8. Insert at the Origin by typing **0,0,0**.

Creating An Area

1. From the GENESYS Shortcut Menu
2. Select **Create Area>Area**
3. Name the area **Area**
4. Select **Polygonal** and **Draw**
5. Turn on the **OSNAP** toggle button at the bottom of the screen to allow the selection process to snap to the intersections. Turn it off and on as needed.
6. Start in the bottom left corner of the parking lot itself and click on each corner working your way around the curb in a counter-clockwise direction back to the first point. Right-click the mouse button to close the polyline.


Note: Make sure you go in a counter-clockwise direction otherwise your light meter will face down instead of up. (Right Hand Rule)
7. Next, select **Create Grid** and set the height to **0'**




Masking The Grid

After adding the grid we must remove the calculation points within the building areas.

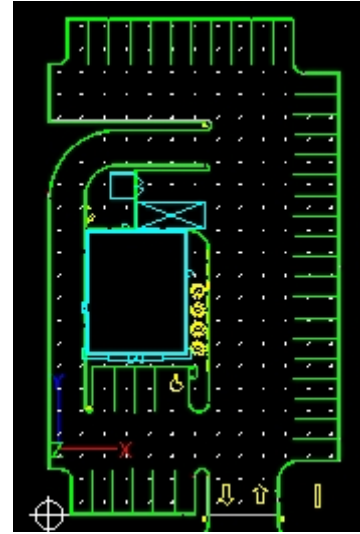
1. From the quick menu on the right select the Grid

Designer tab .


2. To remove or mask points within a rectangular

area select the rectangular mask button  and make sure the mask IN option box is selected.

3. Select the grid to mask by picking directly on a grid point and right-click the mouse. The grid will highlight. Now draw a box around each of the three buildings and press the End button when finished.





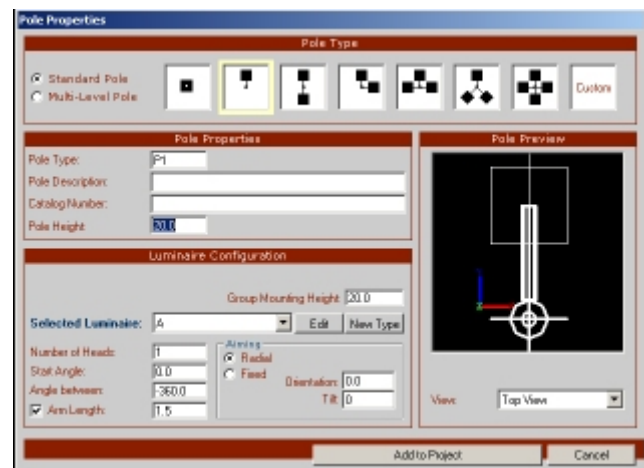
Adding Luminaires

1. Go to  > **catalog**.
2. Under **Advanced Search**, choose **Outdoor**, Product Type: **Site/Roadway>Cutoff**
3. Add Keene > **ELB403MAL-T** to the project.
4. Use the default TYPE ID 'A', Set the LLF to **0.7**, click **OK**

5. Make sure luminaire Z-Adjustment  **Mounting Height** is set to **20'**.

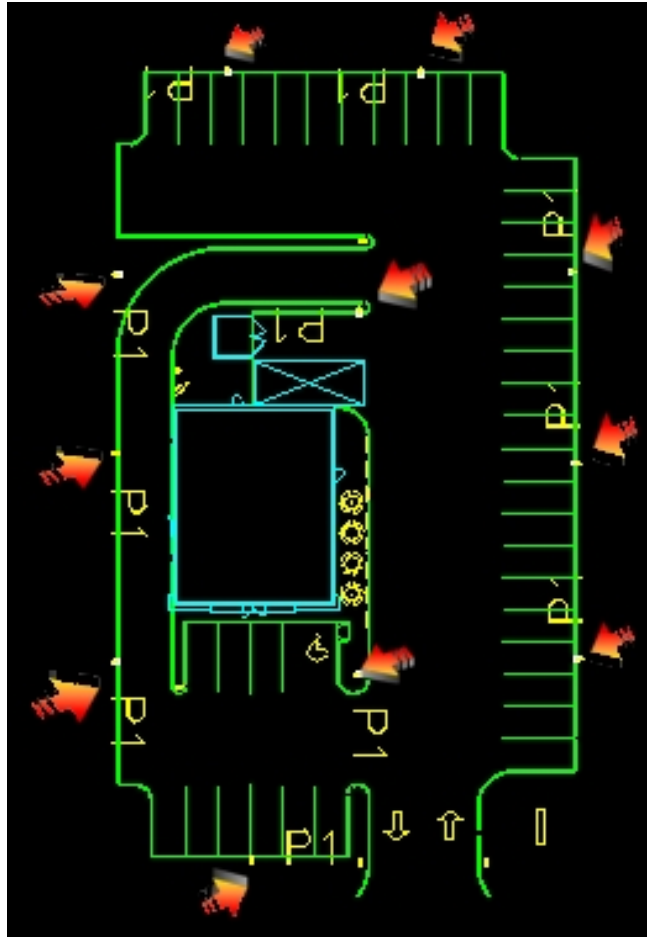
Creating Poletops

1. Go to the Outdoor Designer  and select the poletop button .
2. On the Pole Properties window select **Standard Pole** and pick the second button to create a **single head** facing North.
3. **Add to Project**




Adding Poletops With Automatic ReCalc

1. On the Outdoor Designer window click on the **Auto Recalc** button to initiate automatic calculations as you add and delete poletops.
2. Under the Area section select the **Add & Orient** button.
3. The Add & Orient is a two step procedure. First pick the pole location then the aiming angle by stretching the aiming angle line.
4. Start by placing one at the bottom facing North, 3 along the right, 3 along the left and two across the top and one along the drive through entrance. (See right)
5. Once you are done adding **right click** the mouse and the calculations will update.



Moving Poles And Re-Aiming

1. To move a poletop start by selecting it then select the blue grab box and click the new location to move it to.
2. Or you can move the poletop by selecting it then click on the Move button from the top menu bar  then pick the base point to grab then where you want that new location.
1. To reaim pick the poletop then the Properties window will display. You can change orientation to change the direction it faces.

Ready to Print!

Project #6: Parking Lot

Description: Outdoor Parking Lot



Major Features: DXF/DWG Import
Block Replace
Exterior Lighting
Polygonal Calculation Grid

Lighting: Parking Lot/Exterior


Import a CAD file:

1. Select **File> Import> DXF/DWG**.
2. Select **C:\Program Files\GENESYS\Program\Tutorial\Parking and Stairs Lot.dwg**.
3. Use layer option: **Merge**
4. Do not modify imported geometry: **Done**
5. Choose units: **Meters**
6. Select **FILE ORIGIN** for relative placement point.
7. Insert at: **0,0,0 (Origin)**
8. Orbit the model to orient yourself spatially.

Specify a luminaire and Z-adjustment:

1. Select **Add>Luminaire>ADD TYPE TO SCHEDULE** and perform a database search.
2. Specify the outdoor luminaire:
Manufacturer=Keene
Product Line=FX Series Area Light
Luminaire=FXAM-1000-3V
3. Add it to your project and type a name or select Auto ID.
4. Change to the front view of the model.
5. Determine the height of the pole heads and return to plan view.
6. Change the mounting height to the height of the pole by selecting  >  from the Shortcut menu.

Add luminaire instances and create a group object:


1. Zoom in and select the southern pole object.
2. Note the object name: **A3UR02**
3. Set view focus to the pole by selecting **VIEW>POSITIONING>SET DYNAMIC VIEW CENTER BY OBJECT**.
4. Select and explode the pole object twice to get rid of nested blocks.
5. Turn off OSNAP and SNAP.
6. Place and orient luminaires in the pole heads by accessing  from the Menu.
7. Select pole and luminaires and create a group object by going to **ADD>CREATE GROUP OBJECT**.

8. Pick a base point for the object by clicking on it with your mouse.
9. Name it 'Pole 1'.
10. Change the pole's layer to 'Poles – 2 Head' in the Property Editor.

Replace the existing poles with the new pole object:

1. Select **MODIFY>REPLACE**.
2. Specify filter string: **A3UR02**
3. Replace all instances in the model: **All**
4. Choose select geometry: **S**
5. Click on **Pole 1**.
6. Add the new Pole 1 geometry to the Poles – 2 head layer.

Add a calculation grid and calculate results:

1. Go to **ADD>POLYGONAL**.
2. Draw a polygonal grid inside the parking lot boundary (OSnap should be off).
Spacing=20, Offset=10
3. Zoom in and add rectangular masks around the cars by selecting **ADD>MASKING AREA>RECTANGULAR**>select the grid>press enter>window a rectangle around each car and select END in the Grid Wizard when finished.
4. Turn off all layers that are unnecessary for calculations by selecting  **Layer Listings**.
5. Run 'Direct only' calculations.

Preview output:

1. Click **Output > Output Manager**.
2. Toggle all of the Available Output documents and selected page settings.

Click Preview and review output.

Project #7: Swimming Pool

Description: Indoor Swimming Pool

Major Features: Curved Walls
Complex Ceiling
Advanced Geometry
Advanced Materials

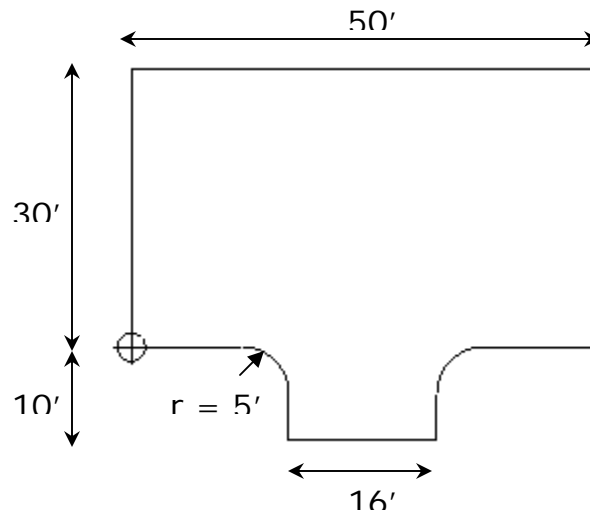
Lighting: Indirect / Direct
Daylighting



Create the floor plan

Note: The complexities of this space require the geometry to be created in several steps. Each of these steps highlights different functionalities within the software including room wizard, extrusions, and the punch tool.

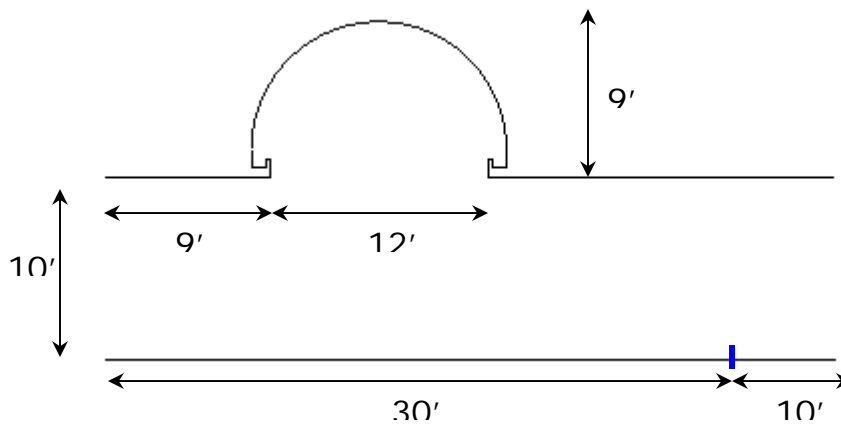
1. Draw an outline of the floor plan using the polyline command. The floor plan is shown below. *Note: You'll use the included Arc command to create the curved walls.*



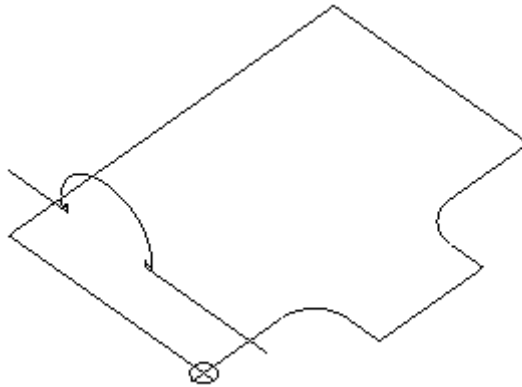
Create the Ceiling Mesh

NOTE: THIS PARTICULAR DESIGN UTILIZES A BARREL VAULT WITH SOFFITS RUNNING ALONG THE X-AXIS OF THE ROOM. UNFORTUNATELY, THE BARREL VAULT DOES NOT ENCOMPASS THE ENTIRE Y-DIMENSION OF THE ROOM. IF IT DID, WE COULD USE THE BARREL VAULT WIZARD WITHIN THE ROOM WIZARD. INSTEAD, WE'LL CREATE THE PROFILE OF THE CEILING ALONG ONE END OF THE ROOM. THEN, WE'LL SIMPLY EXTRUDE THIS TO CREATE THE CEILING MESH.

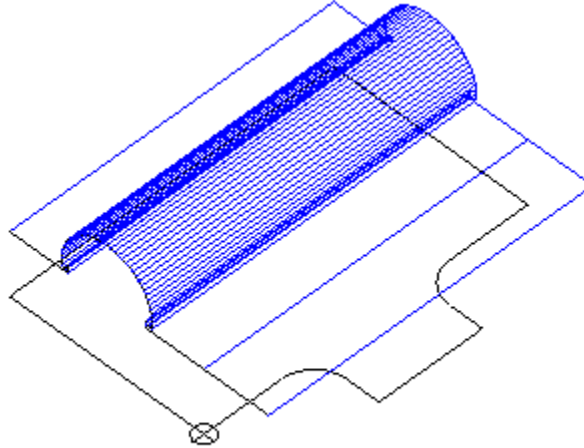
1. Reset the CPlane (Construction Plane) to the Left end view of the room. You can use the CPlane > Ortho > Left commands.
2. Change your CAD view to be the Left View. You may want to zoom / pan as needed to allow for space to draw.
3. Draw the profile of the ceiling as shown below:



4. Click the Isometric View and verify your drawing against the following image:



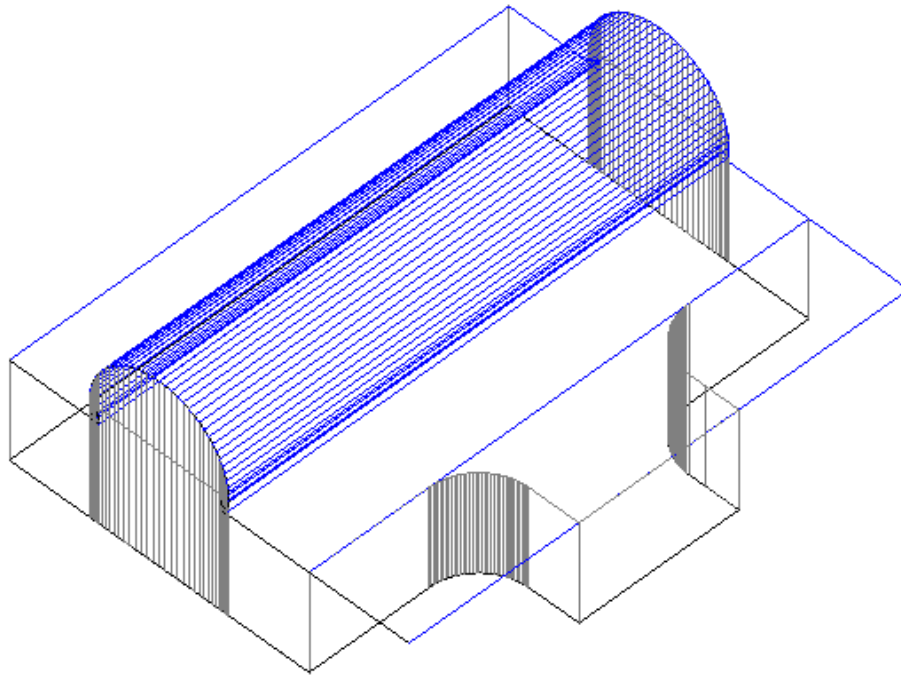
5. You're ready to extrude the new polyline to create the ceiling mesh. Using the Extrude command, click the polyline. Enter an extrusion height of -50 feet. *Note: Why negative? The CPlane is positioned at the left end of the plan view with the Z-axis pointing left (away from the center of the room). Thus, we need to enter a negative (Z) dimension.*



Create the Room

*NOTE: WE NOW HAVE THE COMPONENTS TO CREATE A COMPLEX ROOM USING THE ROOM WIZARD:
FLOOR PLAN POLYLINE AND A CEILING MESH.*

1. Start the Room Wizard by clicking the **Create Area** button on the Designer Shortcut Menu.
2. Click **Room**.
3. Enter "Pool" for the name of the room.
4. Click on the **Select** button to select a polygonal boundary for the room.
5. Select the floor plan polyline you created.
6. On the Wizard, click the third room icon – Complex Ceiling type.
7. On the next Wizard step, select the Ceiling Mesh type.
8. In the CAD view, select the extruded mesh you created for the ceiling.
9. Use the Default reflectances for the room and do not add a calculation grid at this time.
10. The Wizard is complete and your space should now look like this:

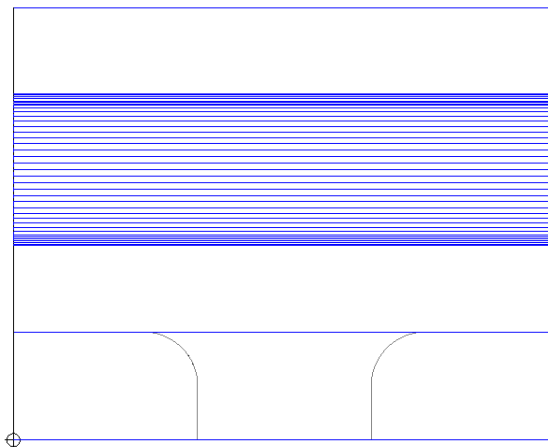


* Save your project as "Swimming Pool Tutorial".

Create the Pool

Note: For the swimming pool, we'll "rebuild" the floor using the outline of the pool. Then we'll extrude the pool walls and, with a little cheating, create the water surface.

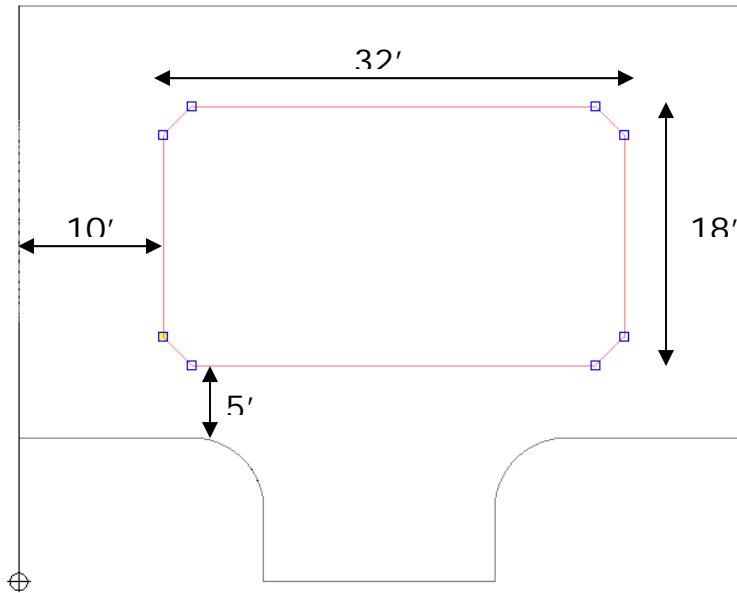
1. Return the CPlane to the World coordinates. Use CPlane > World.
2. Switch your CAD view to the Plan view.



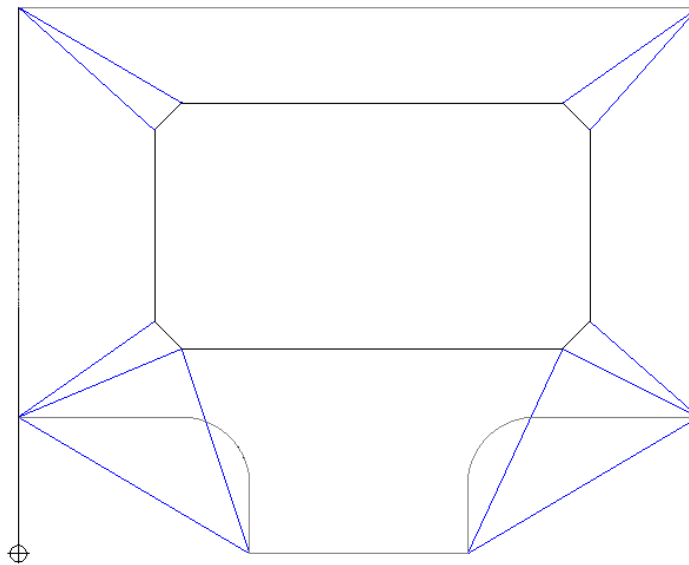
3. To simplify your CAD view and ease drawing of the pool, turn off the Ceiling layer. This can be done in the Layer manager (via Layers) or using the Layer Explorer on the Designer Pane (upper right). *Note: Did the barrel vault*

ceiling disappear? No? It's still on the Object layer from your original extrusion. Select it and change its' layer to Ceiling in the Property control.

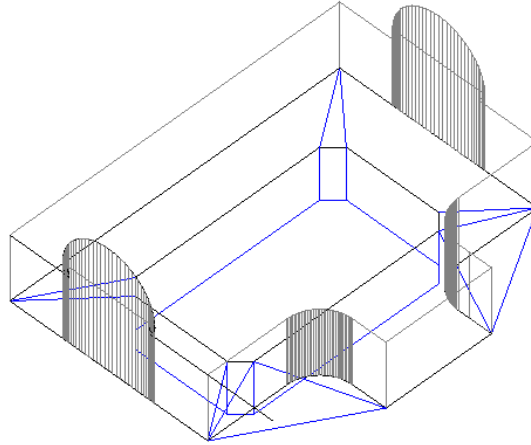
4. Draw a polyline as shown below:



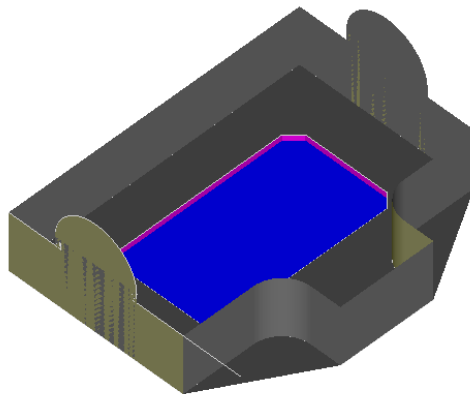
5. Select the existing Floor, and erase it. Using the Polygon command and OSnaps ON, create several new polygons for the new floor. See the view below:



6. We're now ready to create the pool walls and the water. Click on the pool outline and use the **ExtrudeWithCaps** command. Enter $-8'$ for the extrusion height.



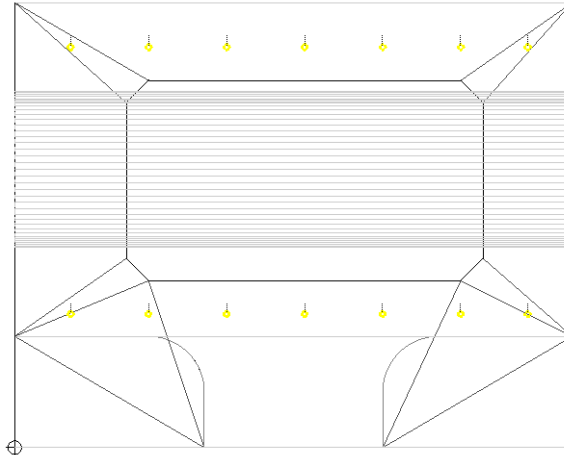
7. Create a new layer called "Pool Walls". Click on the newly defined pool wall mesh and change its layer to "Pool Walls".
8. Use the Explode command to ungroup the pool wall surfaces. Click on the top surface (water) and move it 1' down. Note: You may want to change to surface orientation mode to click on the appropriate surface. You'll also need to re-orient the top surface to face up (its facing inward by default).
9. Create a new layer called "Water". Change the layer of the "water" surface to be "Water".



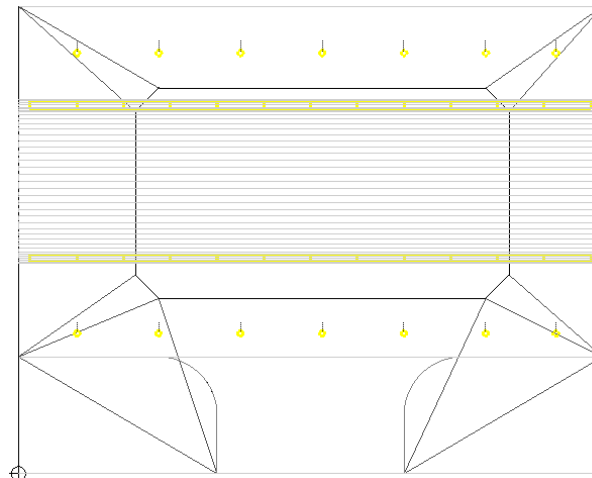
Add the Lighting

Note: Feel free to let your creative spirit run free as we add lighting to the space. For this example, we'll add some downlighting around the pool and indirect lighting along the soffits in the barrel vault.

1. Accessing the LTI Lighting Library, select an appropriate downlight.
2. Once added to the schedule, the default mounting (Z-Adjustment) will be Ceiling Recessed. This is appropriate and we'll leave it. Add the downlights around the pool on both sides of the vault.



3. Select an indirect product and add it to the schedule. Change the Z-Adjustment to Mounting Height = 10.75' (just above the soffit).
4. Add a single indirect at x=3', y=21.6'. Select it.
5. Create a rectangular array using the Array > Rectangular command. Enter 2 rows, 12 columns. Row spacing = -13.2' and the Column spacing is 4'.
6. Your initial lighting is now complete.



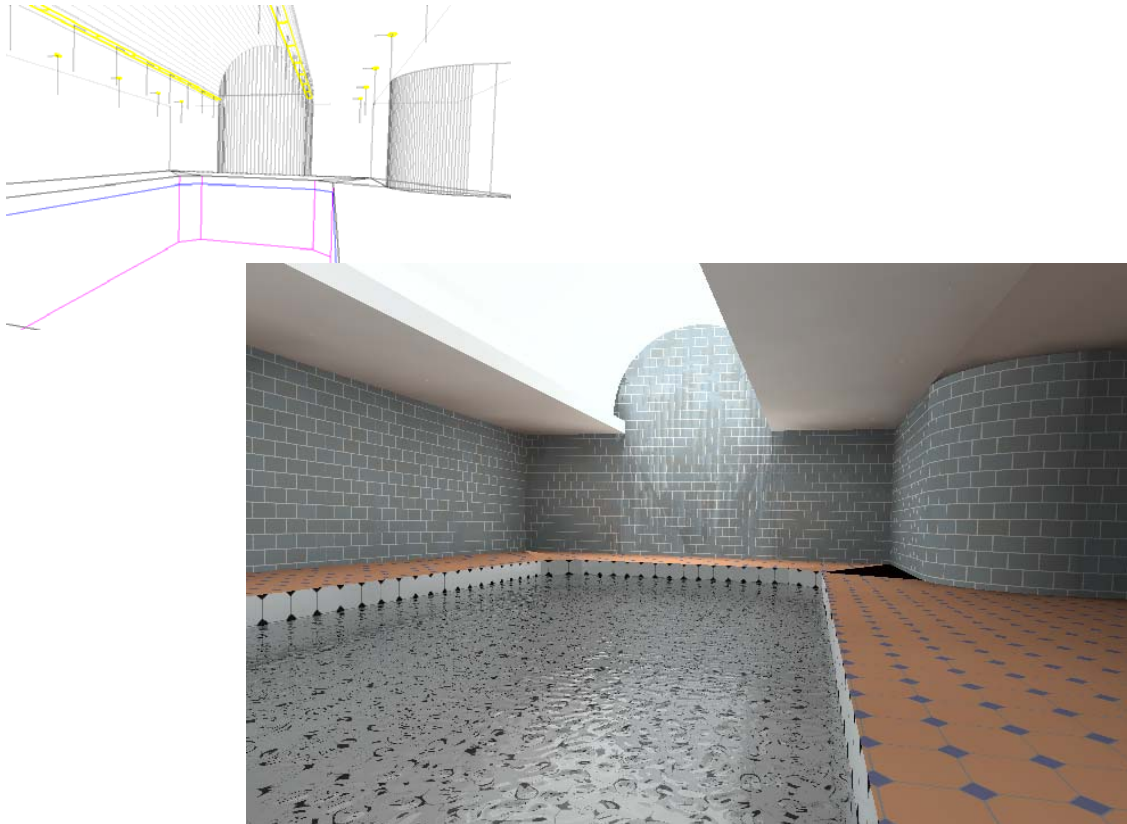
Select and Apply Materials

Following your instructor's guidance, select and apply materials by layer. You will also utilize the surface orientation mode to verify that all surfaces are oriented properly.

"Water" Material : To model the water surface, select the 'Rippled Glass' material. You can vary the wave size and frequency by changing the roughness properties of the material.

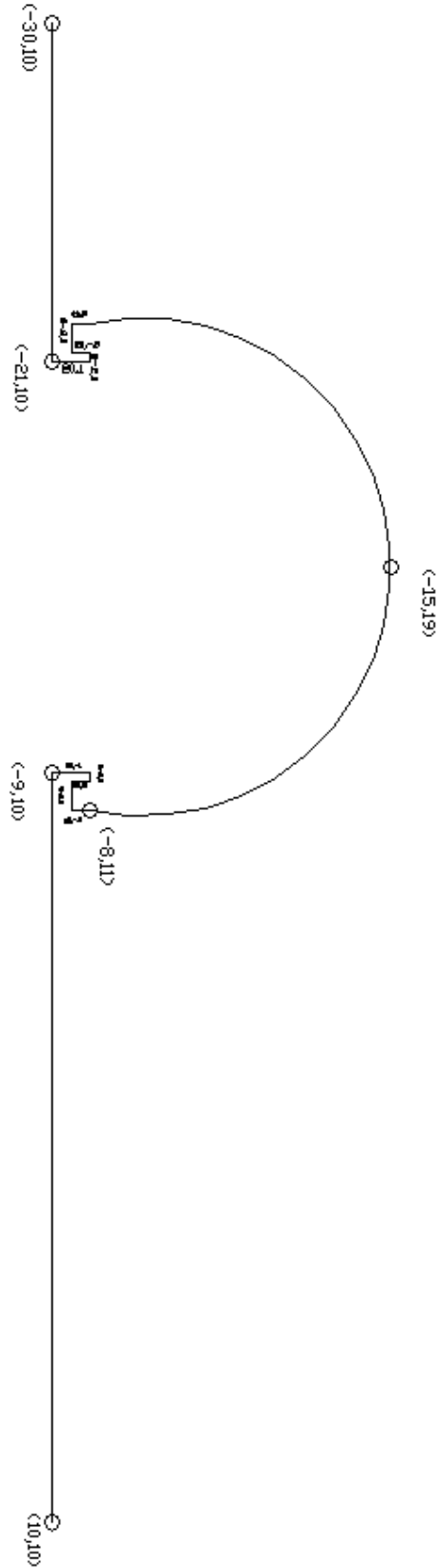
Run Initial Calculations

Utilizing the Fast, Basic calculation template. Run calculations to verify surfaces, materials, and lighting. How does it look?



Extra Credit: Advanced Topics

- Add some furniture.
- Try changing the East wall to glass and adding mullions. The mullions can be added by extruding a small square to the ceiling as a 'wall'.
- Add an exterior patio with some exterior lighting.
- Also, utilize the Advanced Rendering Plug-In capability to add a background image.

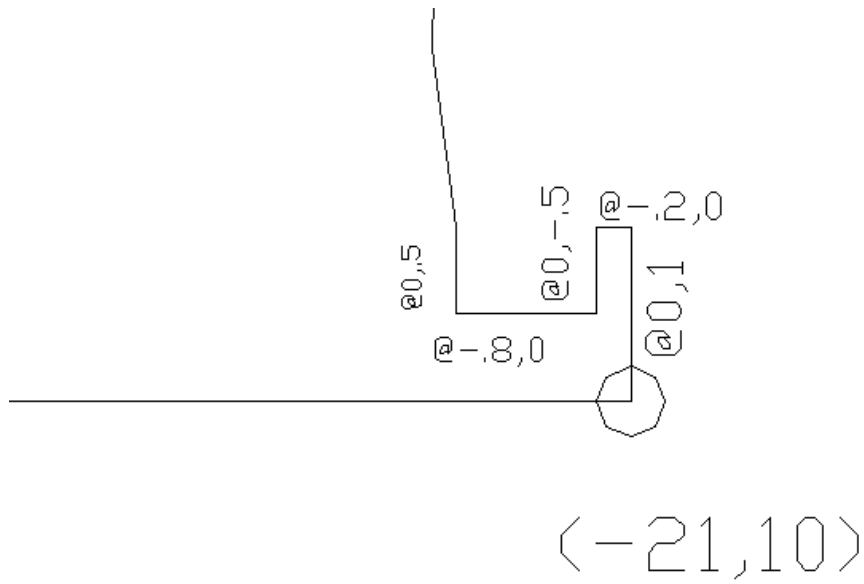


Soffit Coordinates:

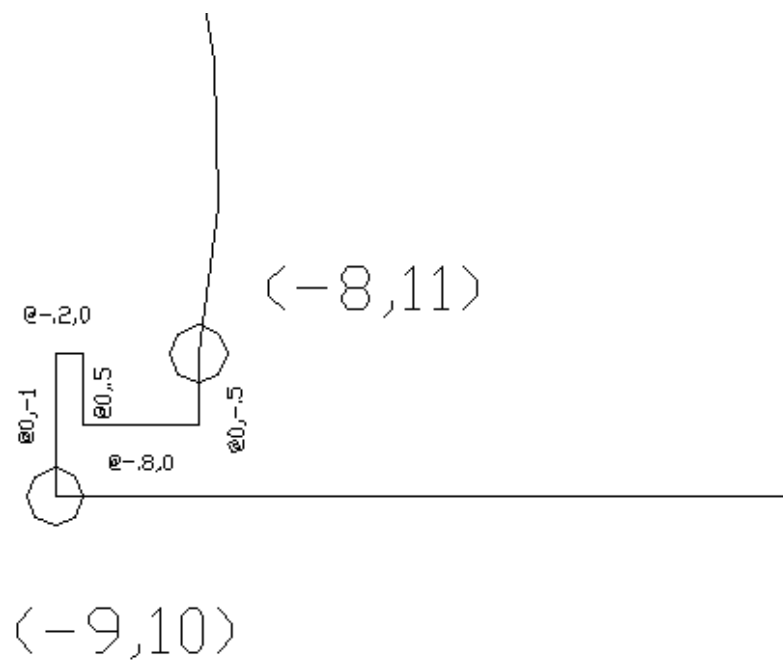


Empowering Success

Left Soffit:



Right Soffit:



PHOTOMETRIC FORMATS SUPPORTED BY GENESYS III

- IES LM-63-95 TO LM-63-2002
- CIBSE TM14 1988
- EULUMDAT
- CIE
- LTL-I



Available Commands - Alphabetic

Command subjects that GENESYS III currently supports are listed below; the actual commands and their aliases are provided in brackets. Commands are not case-specific; capitals are just included here for clarity. To view this list, type ? in the command line at any time.

Notes:

Available commands:

- **ARC** [ARC, A]
- **ARCHCONVERT** [CONVERTTOCEILING, CONVERTTOWALL, CONVERTTOFLOOR]
- **AREA** [AREA, AREAROOM]
- **ARRAY** [ARRAY, ARRAY_ROTATE]
- **BLOCK** [BLOCK, GROUP]
- **CIRCLE** [CIRCLE, C]
- **COMMAND HELP** [HELP, ?, HELP_TOC, HELP_INDEX]
- **CONFIGURATION** [CONFIGURATION, CONFIG]
- **CONFIGURE** [CONFIGUREPROJECT]
- **COPY** [COPY, CP]
- **CPLANE** [CPLANE, CONSTRUCTIONPLANE]
- **DIMENSION** [DIM]
- **DISPLAY** [DISPLAY]
- **DISTANCE** [DIST, DISTANCE]
- **DYNAMICVIEWLW** [ORBIT, PAN, DOLLY, TILT, TURN, LOOK, ROLL, DYNAMICZOOM]
- **ELLIPSE** [ELLIPSE]
- **ERASE** [ERASE, E]
- **EXPLODE** [EXPLODE, X]
- **EXPORTDWG** [DXFOUT, DWGOUT, EXPORTDWG, EXPORTDXF]
- **EXTRUDE** [EXTRUDE, EXTRUDEWITHCAPS]
- **EXTRUDETOMESH** [EXTRUDETOMESH]
- **GRID** [GRID, G]
- **GRIDEDIT** [EDITGRID]
- **GRIDMASK** [MASK, UNMASK, MASK_INSIDE, MASK_OUTSIDE, UNMASK_INSIDE, UNMASK_OUTSIDE]
- **GRIDSTAT** [STAT]
- **GROUP** [GROUP]
- **IMPORTDWG** [DXFIN, DWGIN, IMPORTDWG, IMPORTDXF]
- **IMPORTSTL** [STLIN, IMPORTSTL]
- **LAYER** [LAYER, LAYERS, LISTLAYERS, REMOVE_LAYER, CHANGELAYER]
- **LUMINAIREADD** [LUM, ADDLUM, ADDLUMROTATE, ADDLUMAIM, ADDLUMARRAY, ADDLUMARRAYROTATE]
- **MESH** [POLYGON2MESH, P2M]
- **MIRROR** [MIRROR]
- **MOVE** [MOVE, M]
- **OFFSET** [OFFSET]
- **OSNAP** [OSNAP]
- **PLACELUM** [PLACELUM]
- **POLYGON** [POLYGON, 3DFACE]
- **POLYLINE** [PLINE, POLYLINE, L, LINE, CLOSEDPOLYLINE, LINE3D]
- **PUNCH** [PUNCH]



- **RECTANGLE** [RECT, RECTANG, RECTANGLE]
- **REDO** [REDO, R]
- **REPARENT** [REPARENT]
- **REPLACE** [REPLACE]
- **REVOLVE** [REVOLVE, REVSURF, TABSURF]
- **ROOM** [ROOM, WALLS]
- **ROTATE** [ROTATE]
- **SCALE** [SCALE, S]
- **SELECTION** [SELECTINCLUDE, SELECTINCLUDECOUNT, SELECTEXCLUDE]
- **SETTINGS** [APPLICATIONSETTINGS, PROJECTSETTINGS, CPLANESETTINGS]
- **STRETCH** [STRETCH]
- **SURFACEORIENTATION** [ORIENT]
- **SURFTAB1** [SURFTAB1, SETU]
- **SURFTAB2** [SURFTAB2, SETV]
- **TEXT** [TEXT]
- **UCS** [MCS]
- **UNDO** [UNDO, U]
- **VIEWLW** [VIEW, VIEWORIENT, VO, VIEWPOSITION, VIEWMODE, VM, VIEWSETTINGS, VIEWCENTER, VIEWSAVE, V, VIEWNAME, VI, PERSP, CULLED]
- **WINDOW** [WINDOW]
- **ZOOM** [ZOOM, Z, ZOOMIN, ZI, ZOOMOUT, ZO, ZOOMEXTENTS, ZE, ZOOMWINDOW, ZW, ZOOMPREVIOUS, ZP, ZOOMDYNAMIC, ZD]



Available Commands - Topical

Command subjects that GENESYS III currently supports are listed below; the actual commands and their aliases are provided in brackets. Commands are not case-specific; capitals are just included here for clarity.

Notes:

Commands by type:

File Commands>>

- **CONFIGURATION** [CONFIGURATION, CONFIG]
- **CONFIGURE** [CONFIGUREPROJECT]
- **EXPORTDWG** [DXFOUT, DWGOUT, EXPORTDWG, EXPORTDXF]
- **IMPORTDWG** [DXFIN, DWGIN, IMPORTDWG, IMPORTDXF]
- **IMPORTSTL** [STLIN, IMPORTSTL]
- **SETTINGS** [APPLICATIONSETTINGS, PROJECTSETTINGS, CPLANESETTINGS]

View Commands>>

- **DISPLAY** [DISPLAY]
- **DYNAMICVIEWLW** [ORBIT, PAN, DOLLY, TILT, TURN, LOOK, ROLL, DYNAMICZOOM]
- **VIEWLW** [VIEW, VIEWORIENT, VO, VIEWPOSITION, VIEWMODE, VM, VIEWSETTINGS, VIEWCENTER, VIEWSAVE, V, VIEWNAME, VI, PERSP, CULLED]
- **ZOOM** [ZOOM, Z, ZOOMIN, ZI, ZOOMOUT, ZO, ZOOMEXTENTS, ZE, ZOOMWINDOW, ZW, ZOOMPREVIOUS, ZP, ZOOMDYNAMIC, ZD]

Add Commands>>

- **AREA** [AREA, AREAROOM]
- **BLOCK** [BLOCK, GROUP]
- **EXTRUDE** [EXTRUDE, EXTRUDEWITHCAPS]
- **EXTRUDETOMESH** [EXTRUDETOMESH]
- **GRID** [GRID, G]
- **GRIDMASK** [MASK, UNMASK, MASK_INSIDE, MASK_OUTSIDE, UNMASK_INSIDE, UNMASK_OUTSIDE]
- **GRIDSTAT** [STAT]
- **GROUP** [GROUP]
- **LUMINAIREADD** [LUM, ADDLUM, ADDLUMROTATE, ADDLUMAIM, ADDLUMARRAY, ADDLUMARRAYROTATE]
- **POLYGON** [POLYGON, 3DFACE]
- **REVOLVE** [REVOLVE, REVSURF, TABSURF]
- **ROOM** [ROOM, WALLS]

Draw Commands>>

- **ARC** [ARC, A]
- **CIRCLE** [CIRCLE, C]
- **ELLIPSE** [ELLIPSE]
- **POLYLINE** [PLINE, POLYLINE, L, LINE, CLOSEDPOLYLINE, LINE3D]
- **RECTANGLE** [RECT, RECTANG, RECTANGLE]
- **TEXT** [TEXT]
- **DIMENSION** [DIM]



Modify Commands>>

- **ARRAY** [ARRAY, ARRAY_ROTATE]
- **COPY** [COPY, CP]
- **DISTANCE** [DIST, DISTANCE]
- **ERASE** [ERASE, E]
- **EXPLODE** [EXPLODE, X]
- **GRIDEDIT** [EDITGRID]
- **MESH** [POLYGON2MESH, P2M]
- **MIRROR** [MIRROR]
- **MOVE** [MOVE, M]
- **OFFSET** [OFFSET]
- **PLACELUM** [PLACELUM]
- **REDO** [REDO, R]
- **REPARENT** [REPARENT]
- **REPLACE** [REPLACE]
- **REVOLVE** [REVOLVE, REVSURF, TABSURF]
- **ROTATE** [ROTATE]
- **SCALE** [SCALE, S]
- **STRETCH** [STRETCH]
- **SURFACEORIENTATION** [ORIENT]
- **UNDO** [UNDO, U]

Tools Commands>>

- **CPLANE** [CPLANE, CONSTRUCTIONPLANE]
- **SELECTION** [SELECTINCLUDE, SELECTINCLUDECOUNT, SELECTEXCLUDE, SELECT]
- **UCS** [MCS]

Precision Tool Commands>>

- **OSNAP** [OSNAP]

Layer Commands>>

- **LAYER** [LAYER, LAYERS, LISTLAYERS]

Calculate Commands>>**Output Commands>>****Window Commands>>****Help Commands>>**

- **COMMAND HELP** [HELP, ?, HELP_TOC, HELP_INDEX]

Model Spaces Commands>>

- **AREA** [AREA, AREAROOM]
- **ROOM** [ROOM, WALLS]
- **ARCHCONVERT** [CONVERTTOCEILING, CONVERTTOWALL, CONVERTTOFLOOR]
- **PUNCH** [PUNCH]
- **WINDOW** [WINDOW]

Architectural Object Commands>>

- **BLOCK** [BLOCK, GROUP]
- **EXTRUDE** [EXTRUDE, EXTRUDEWITHCAPS]
- **EXTRUDETOMESH** [EXTRUDETOMESH]



- **GROUP** [GROUP]
- **MESH** [POLYGON2MESH, P2M]
- **POLYGON** [POLYGON, 3DFACE]
- **REVOLVE** [REVOLVE, REVSURF, TABSURF]
- **SURFACEORIENTATION** [ORIENT]
- **SURFTAB1** [SURFTAB1, SETU]
- **SURFTAB2** [SURFTAB2, SETV]

Luminaire Commands>>

- **LUMINAIREADD** [LUM, ADDLUM, ADDLUMROTATE, ADDLUMAIM, ADDLUMARRAY, ADDLUMARRAYROTATE]
- **PLACELUM** [PLACELUM]
- **REPLACE** [REPLACE]

Calculation Grid Commands>>

- **GRID** [GRID, G]
- **GRIDEDIT** [EDITGRID]
- **GRIDMASK** [MASK, UNMASK, MASK_INSIDE, MASK_OUTSIDE, UNMASK_INSIDE, UNMASK_OUTSIDE]
- **GRIDSTAT** [STAT]

