



sistemas de representacion 2
weblog sr2_mario vergara



CARACTERISTICAS GENERALES

Grasshopper – Explicit History- Creado por David Rutten 2008

-PLUGIN:

Se ejecuta solo con Rhinoceros 4.0 y 5.0, funcionando dentro de este. Grasshopper es un software que toma instancias de clases de objetos de Rhinoceros, y los utiliza en su entorno de visualización

-PROGRAMACION VISUAL:

No es necesario tener conocimientos previos de programación, pero si como este maneja flujo de data y acciones. Grasshopper es un editor visual de programación, por lo que es mucho mas rápido de aprender que Rhino Visual Basic, Python, C++ o .Net
La ultima versión de Grasshopper es la 0.8.0050, donde es posible programar en C++, .Net o Phytthon, lo que aumenta exponencialmente sus capacidades.

-FASE EXPERIMENTAL:

Grasshopper es relativamente un software nuevo, aun se encuentra en versión Beta, por lo tanto no es completamente estable, su código no esta totalmente depurado y puede caerse con facilidad.

DESCARGA GRATUITA:

Grasshopper se descarga de manera gratuita desde www.grasshopper3d.com
Es necesario tener la ultima actualización de Rhinoceros 4.0 SR9 para ejecutar la mas reciente versión



REQUERIMIENTOS MINIMOS

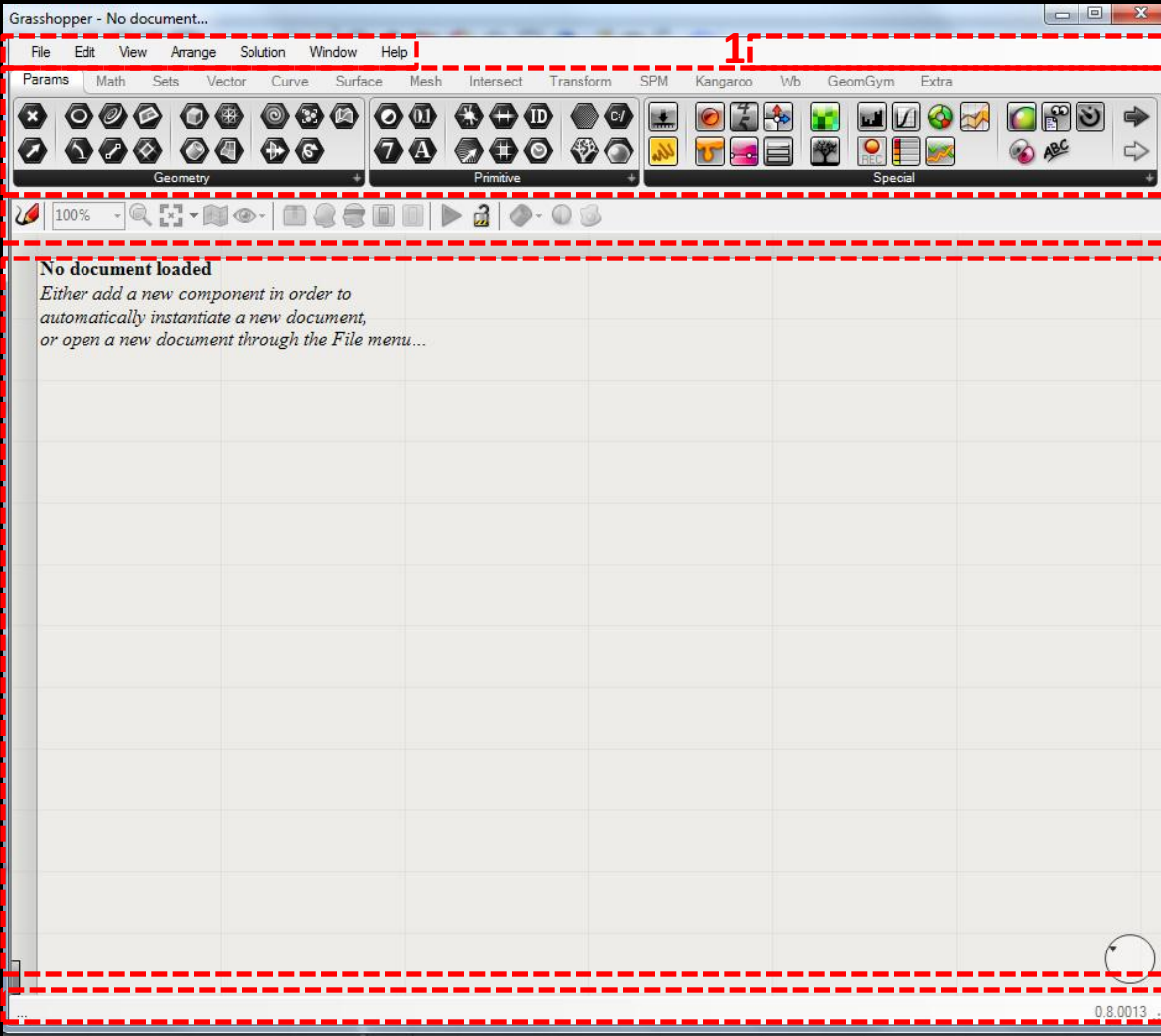
Grasshopper

- Rhinoceros 4.0 Service release 9.
- Pentium, Celeron o procesador mas potente.
- 200 mb de espacio de disco duro.
- 512 mb de ram, 1 gb o mas es recomendado.
- Tarjeta grafica Open Gl.
- Rhinoceros corre solo en Windows 2000, XP, Vista, 7 y en Mac OS (aun GH no corre en Mac).
- Rhinoceros no correra en Windows NT, 95, 98, o ME.
- Rhinoceros funciona en sistemas operativos de 32 y 64 bits.
- Rhinoceros no corre en Linux.





- 0
- 2
- 3
- 4
- 5



INTERFAZ GRASSHOPPER

Grasshopper

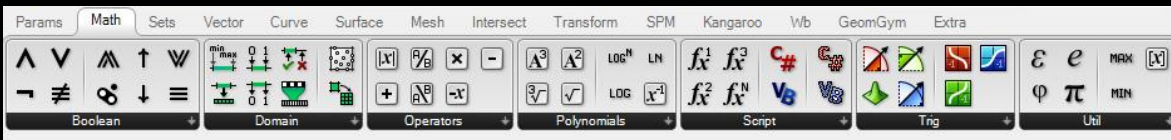
- 0-Menu Principal.
- 1-Navegador de Archivos.
- 2-Categorías de Componentes.
- 3-Barra de Herramientas.
- 4-Lienzo de Trabajo.
- 5-Barra de estado.



-CATEGORIAS DE COMPONENTES



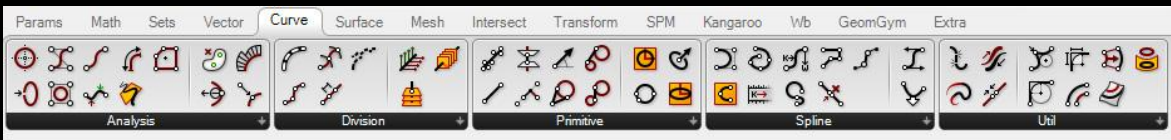
-PARAMS



-MATH



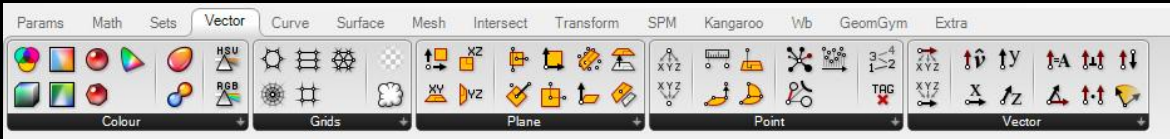
-SETS



-CURVE



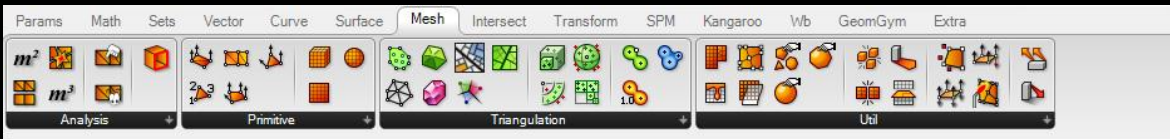
-CATEGORIAS DE COMPONENTES



-VECTOR



-SURFACE



-MESH



-INTERSECT



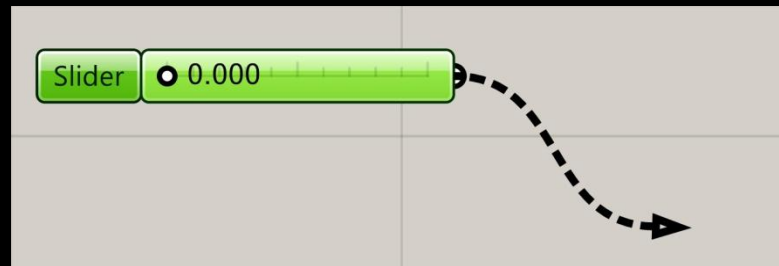
-TRANSFORM



-BARRA DE HERRAMIENTAS

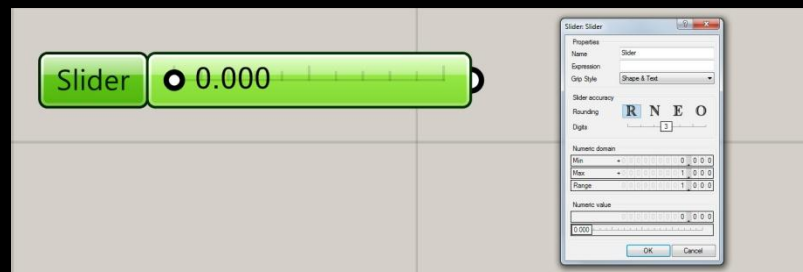
0 1 2 3 4 5 6 7 8 9 10 11

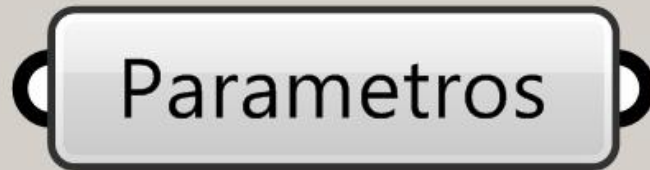
-NUMBER SLIDER
Valores numéricos
que alimentan parámetros
de diferentes elementos



- 0-OBJETOS SKETCH
- 1-ZOOM
- 2-NAVEGADOR DE RED
- 3-ALMACENAJE VISTAS
- 4-CLUSTERS
- 5-VISUALIZACIONES
- 6-DESABILITACIONES
- 7-RECALCULAR
- 8-LOCK
- 9-ESTILOS DE SOMBREADOS
- 10-PERSONALIZACION DE COPILORES
- 11-COCINAR

Parámetros de limite
mínimo y máximo
, y su precisión

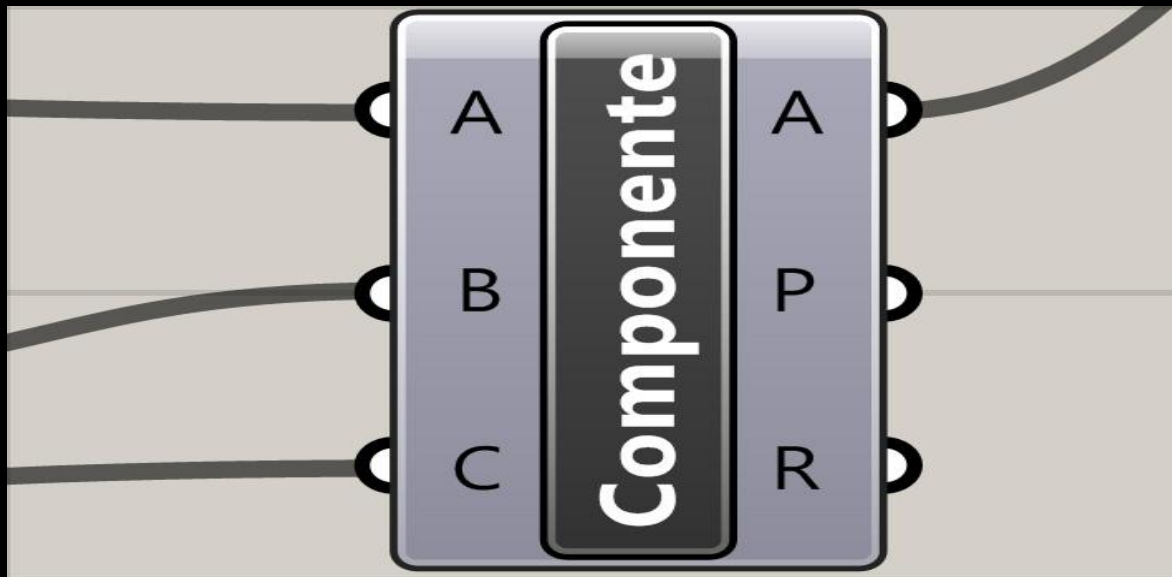




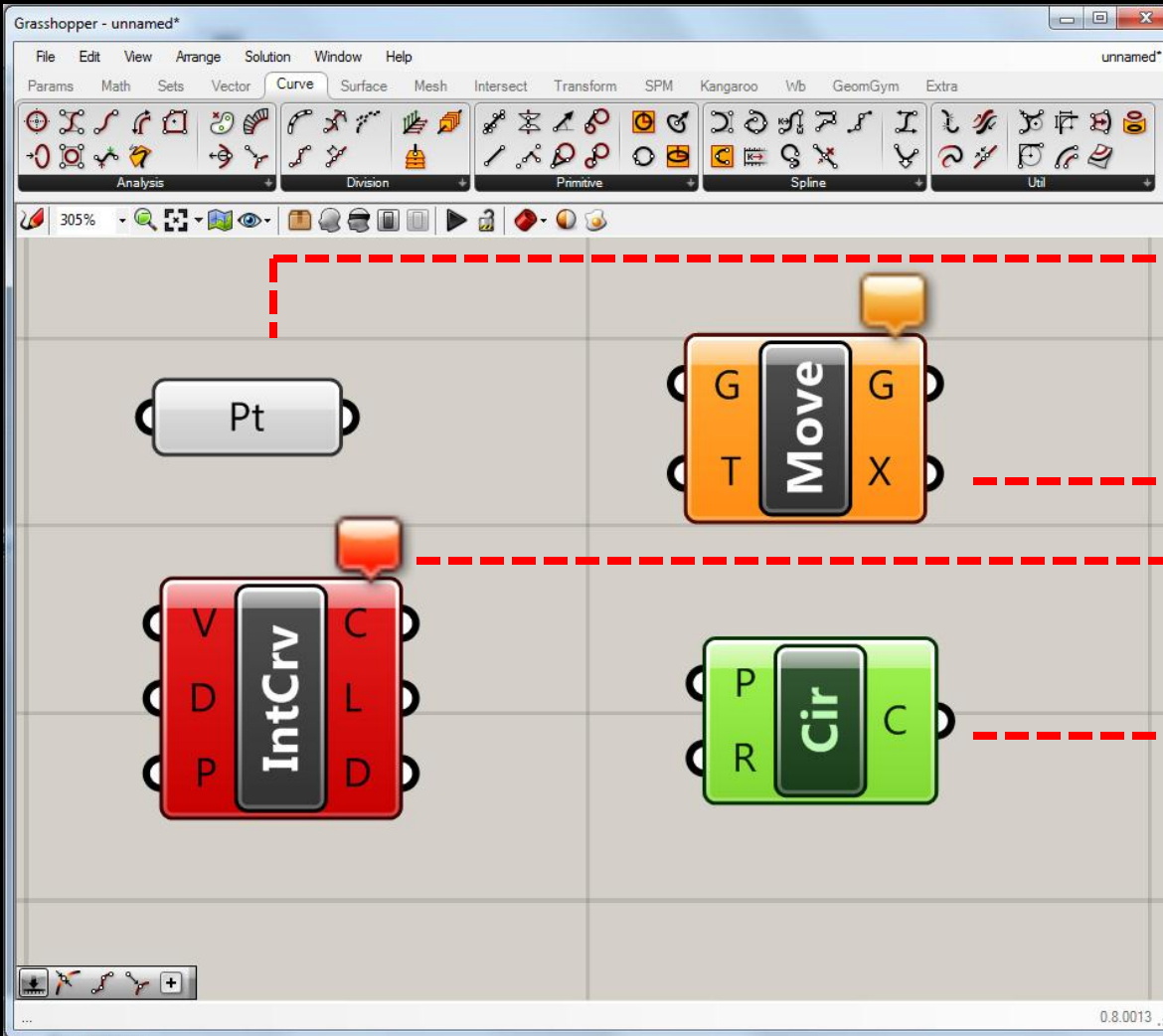
ALMACENA O REFERENCIA DATA
PROVENIENTE DE RHINO O GH

INPUT_INGRESO DE DATA

OUTPUT_SALIDA DE DATA



GENERA O PROCESA DATA

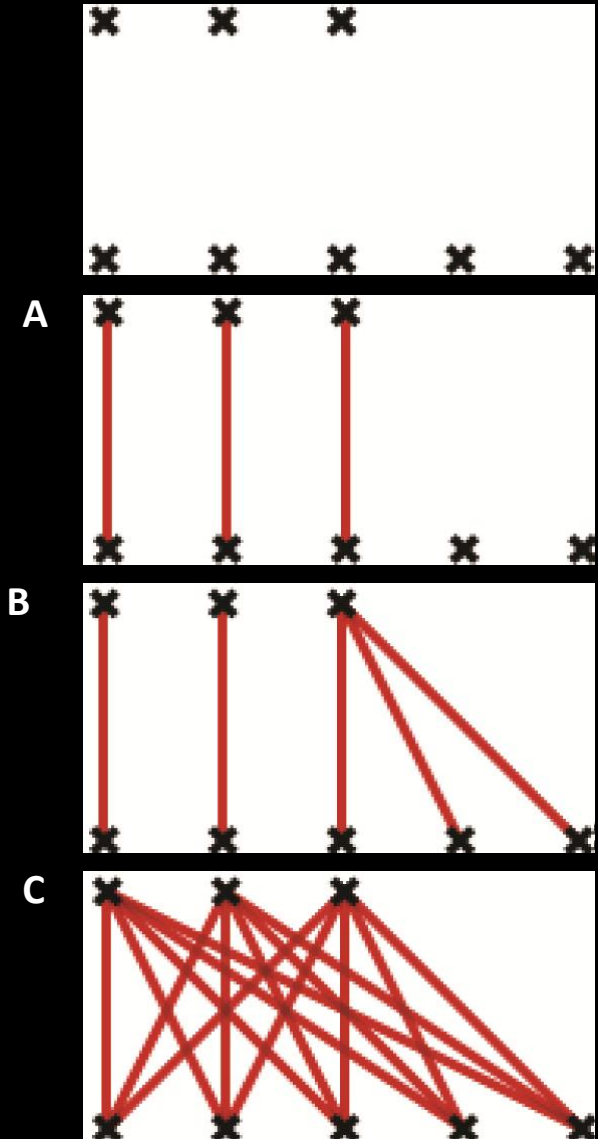
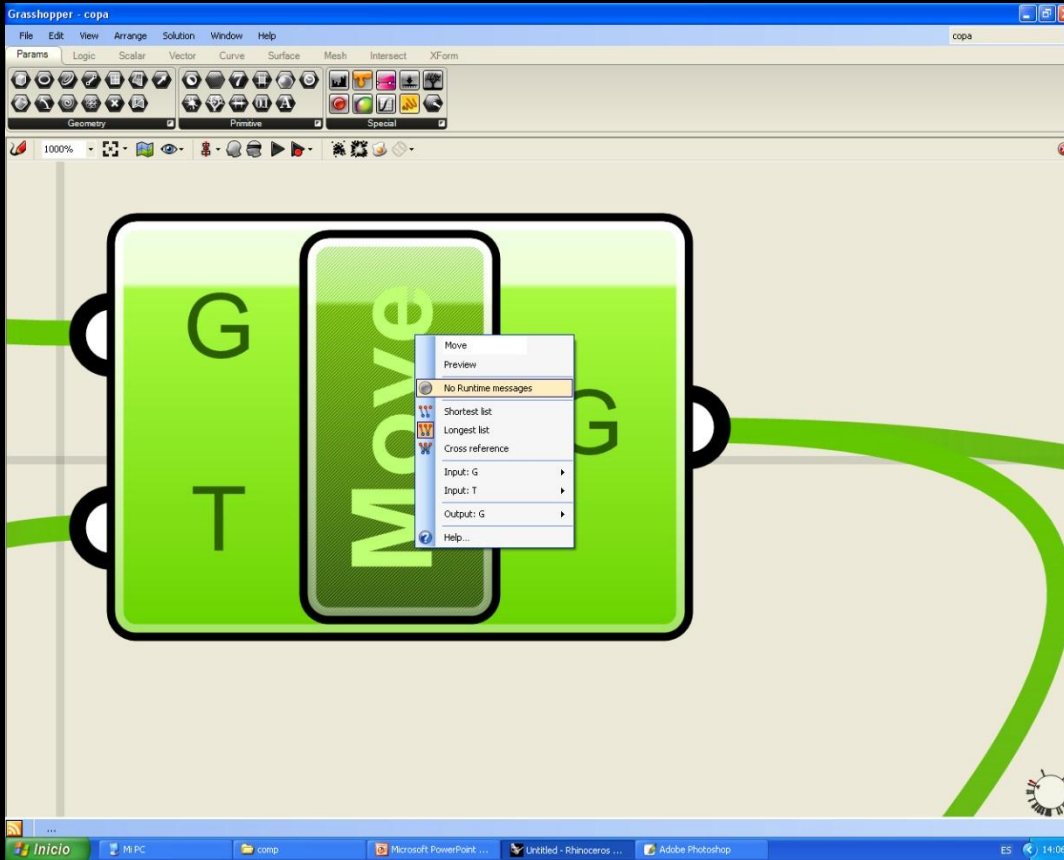


0-NODO FUNCIONANDO

1-NODO CON DATA INCOMPLETA

2-ERROR

3-NODO SELECCIONADO

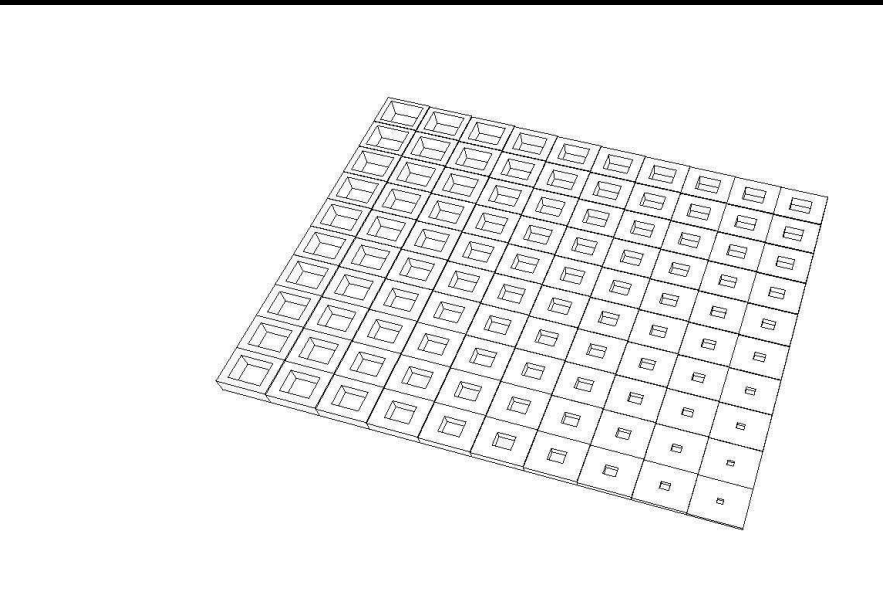
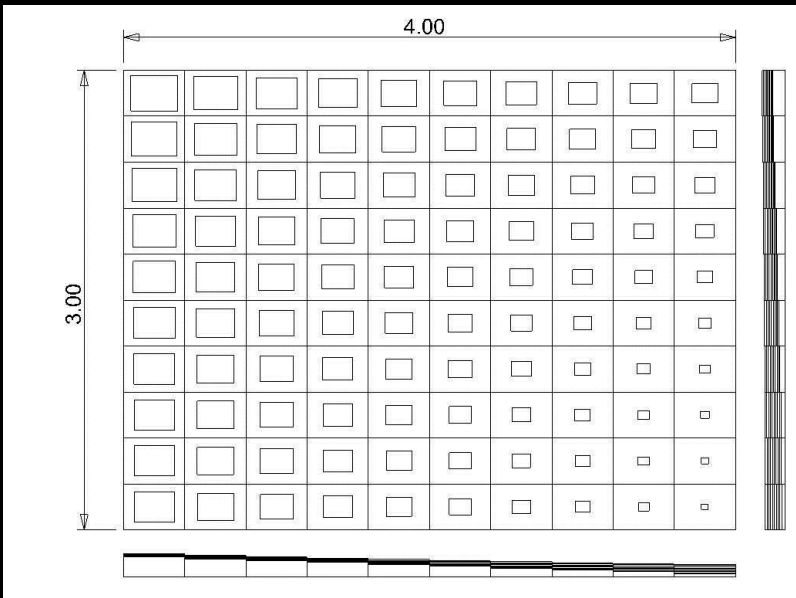
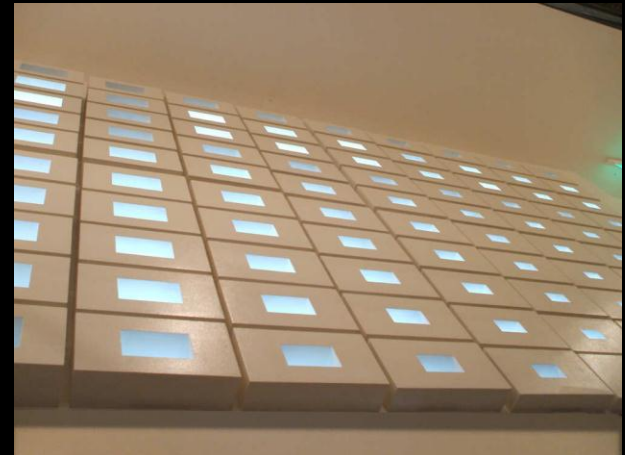
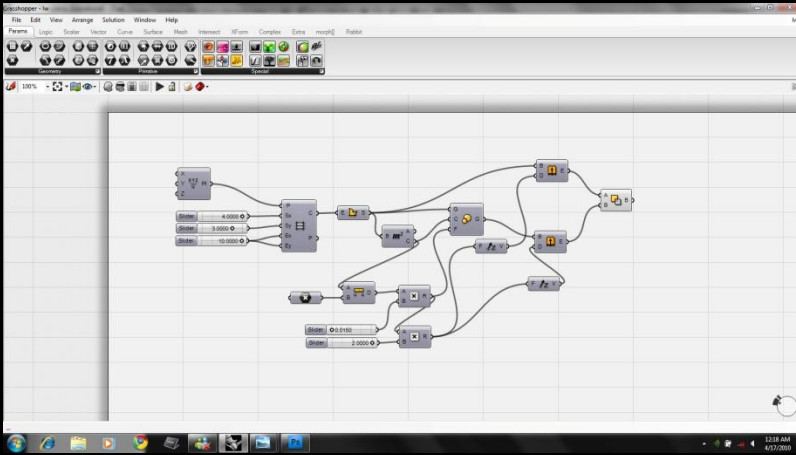


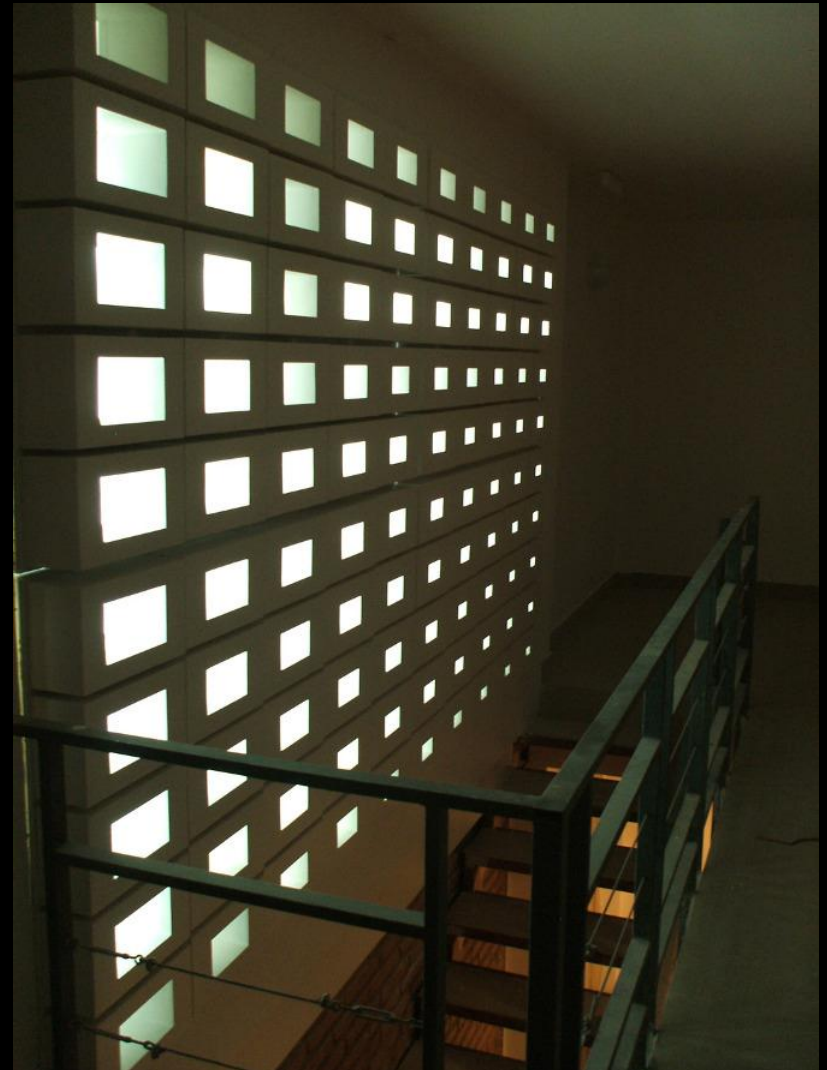
FLUJO DE INFORMACION DATA STREAM MATCHING

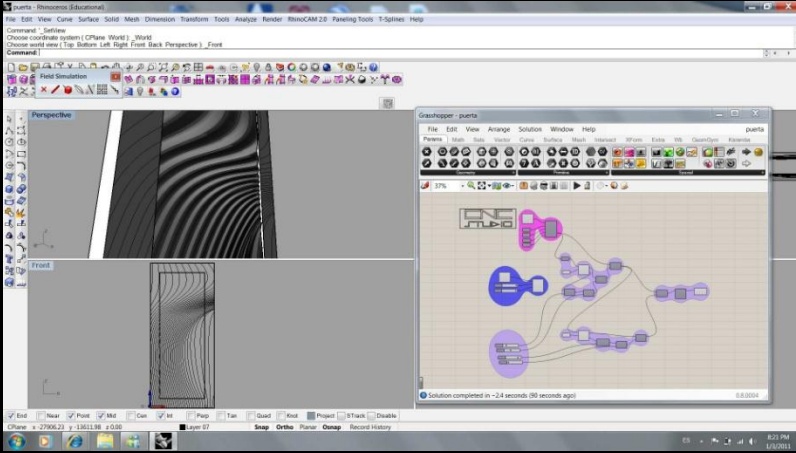
A-Shortest List

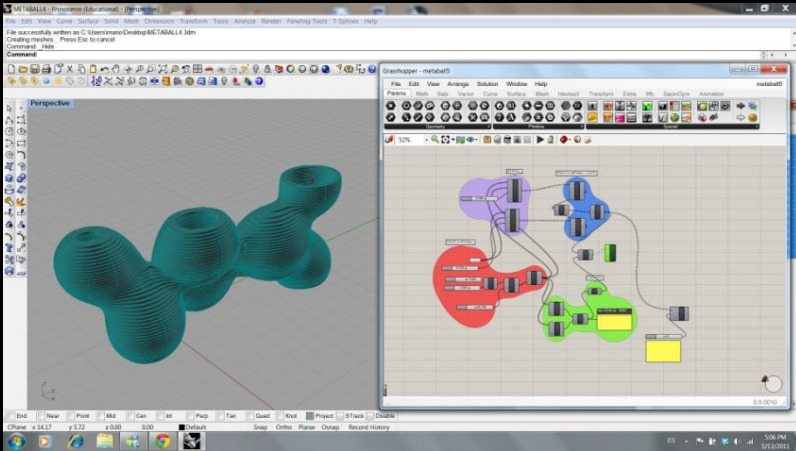
B-Longest List

C-Cross Reference

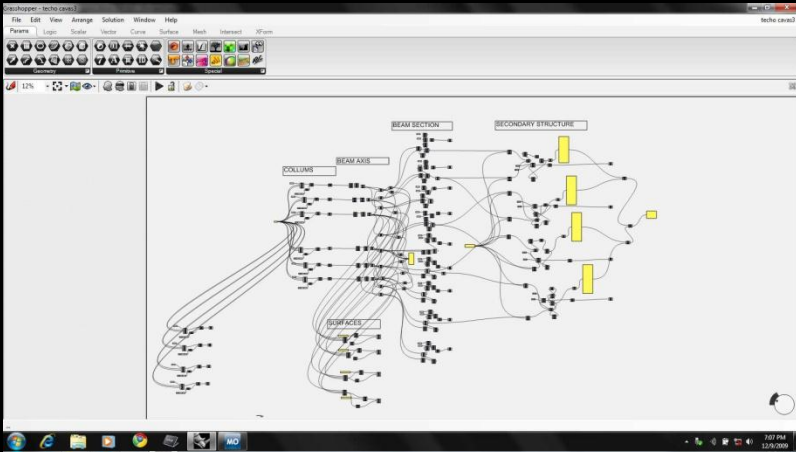










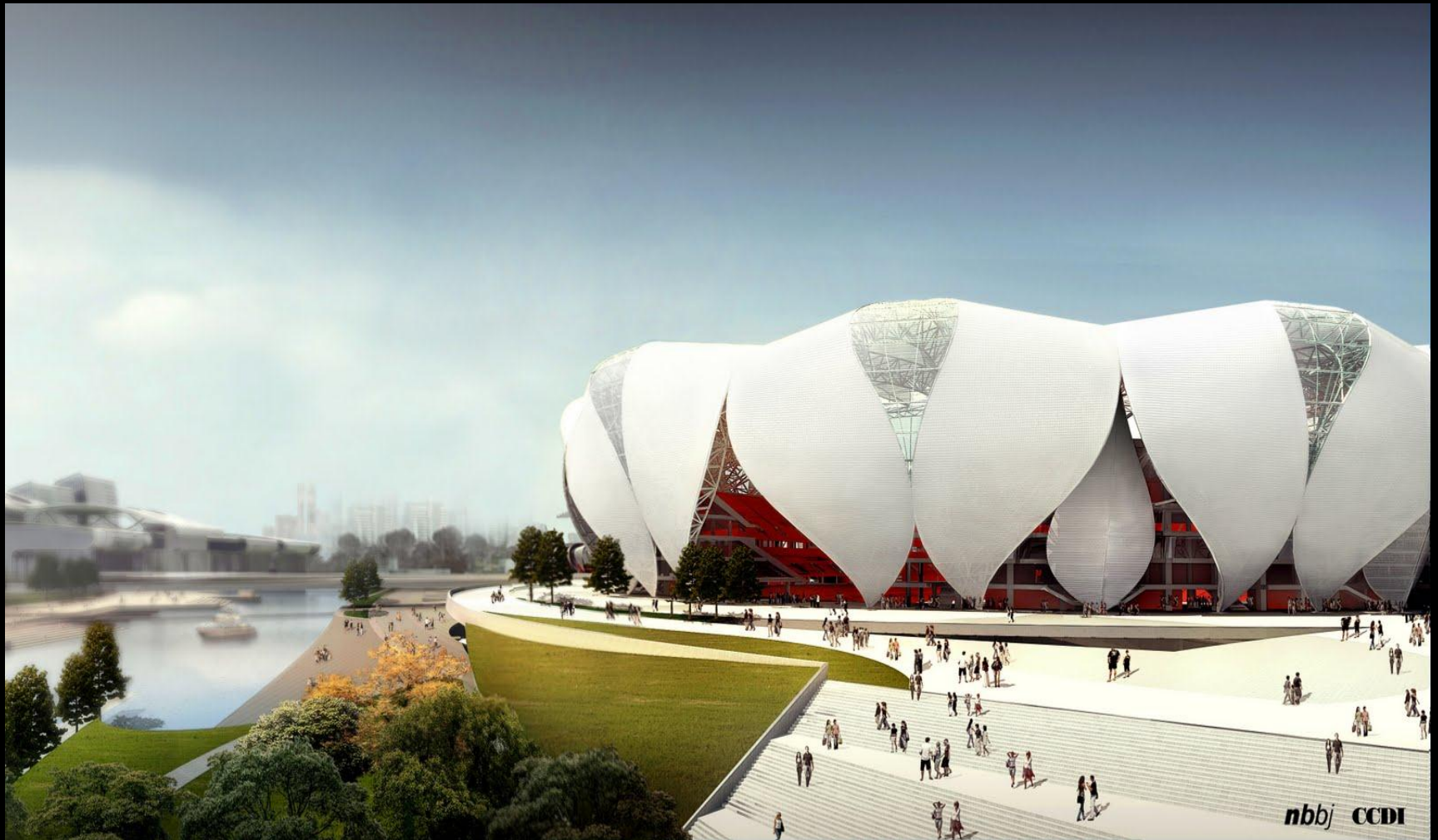




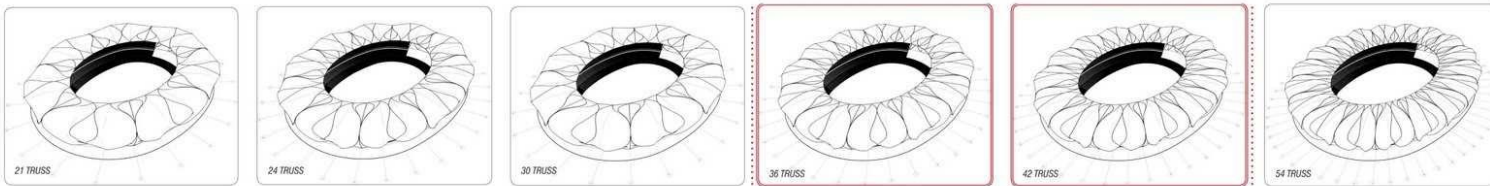
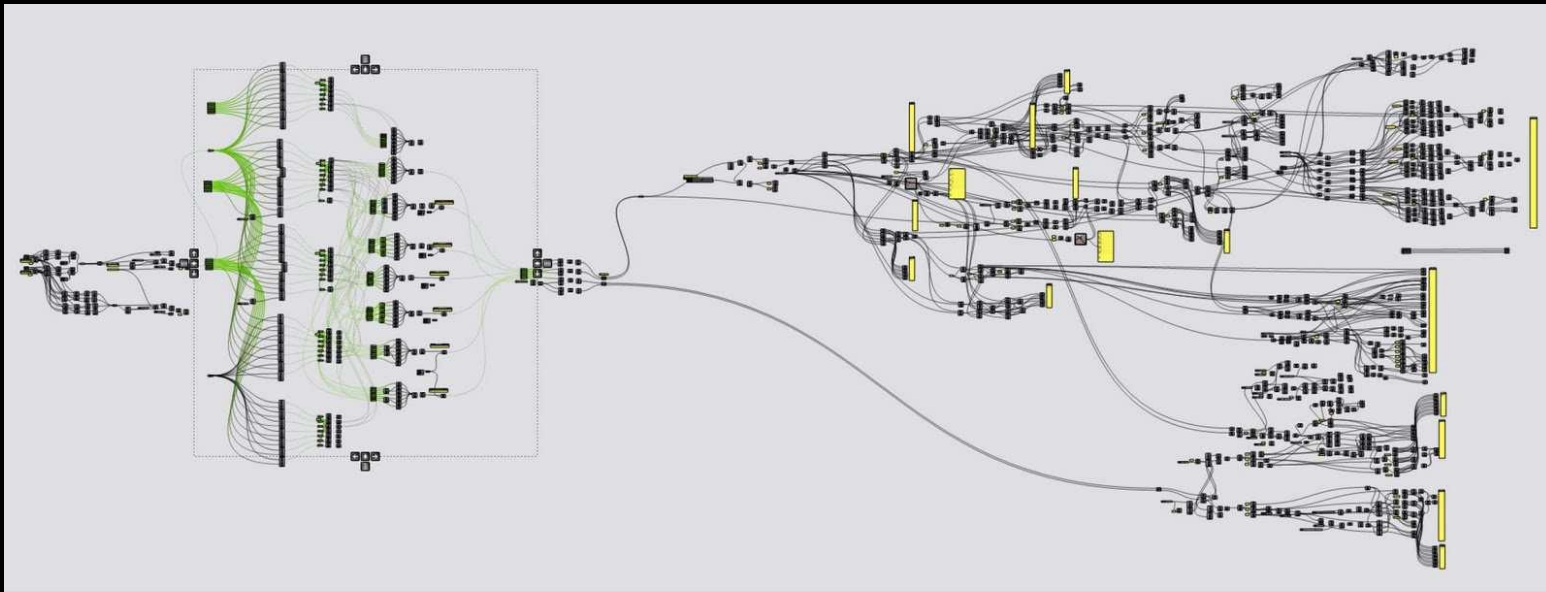
-LIFT ARCHITECTS_FLUX PROJECT



-LIFT ARCHITECTS_SLOW FOOD NATION



-CCDI ARCHITECTS_HANGZHOU STADIUM



nbbj





1



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Processing light table
Processing geometry table
Nothing to render
Command: Grasshopper

Layers - All Layers

Name	Material
Default	
Layer 01	
Layer 02	
Layer 03	
Layer 04	
Layer 05	

Properties

Viewport

Title	Perspective
Width	653
Height	403
Projection	Perspective

Camera

Lens Length	50.0
X Location	137.381
Y Location	-237.957
Z Location	158.638
Location	Place...

Target

X Target	0.000
Y Target	0.000
Z Target	0.000
Location	Place...

Wallpaper

Filename	(none)
Show	<input checked="" type="checkbox"/>
Gray	<input checked="" type="checkbox"/>

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable

CPlane x:28.80 y:-8.07 z:0.00 Default Snap Ortho Planar Osnap Record History

ES 8:51 PM 7/14/2011



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Grasshopper - No document...

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Geometry Primitives Special

100%

No document loaded
Either add a new component in order to automatically instantiate a new document, or open a new document through the File menu...

Properties Viewport

Perspective
653
403
Perspective
50.0
137.381
237.957
158.638
Place...
0.000
0.000
0.000
Place...
(none)

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable
CPlane x: -54.51 y: 86.21 z: 0.00 Default Snap Ortho Planar Osnap Record History

8:51 PM 7/14/2011



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

The image shows the Rhinoceros software interface with the Grasshopper extension. The main workspace is divided into Top and Front views, showing a single point with its X, Y, and Z axes. The Grasshopper window is open, displaying a 'Point XYZ' dropdown menu with options like 'Decompose', 'Point XYZ', 'Distance', 'Point Cylindrical', 'Point Oriented', 'Point Polar', 'Closest Point', 'Pull Point', 'Sort Points', 'Point List', 'Text Tag', and 'Text Tag 3D'. The Properties panel on the right shows the current point's coordinates: X: 50.0, Y: 137.381, Z: -237.957. The status bar at the bottom indicates the current plane is CPlane with coordinates x: 33.51, y: -7.51, z: 0.00. The system tray shows the time as 8:52 PM on 7/14/2011.



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Layers - All Layers
Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Grids Plane Point Vector

100%

Perspective
653
403
Perspective
50.0
137.381
-237.957
158.638
Place...
0.000
0.000
0.000
Place...
(none)

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable
CPlane x31.49 y-22.31 z0.00 Default Snap Ortho Planar Osnap Record History

ES 8:52 PM 7/14/2011



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Number Slider Panel

Boolean Toggle Numeric slider for single values Swatch

Digit Scroller Gradient

MD Slider Value List

Image Sampler Param Viewer

Bar Graph Data Recorder

Graph Mapper Legend

Pie Chart Quick Graph

Value Tracker

Custom Preview Galapagos

Read File Scribble

Timer Cluster Output

Image Gallery Random LoCat

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable

CPlane x:33.60 y:15.61 z:0.00 Default Snap Ortho Planar Onsnap Record History

ES 8:52 PM 7/14/2011



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Geometry Primitive Special

100%

Slider 0.250

X
Y
Z
Pt

Layers - All Layers
Properties Viewport

Perspective
653
403
Perspective

50.0
137.381
-237.957
158.638

Place...

0.000
0.000
0.000

Place...

(none)

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable
CPlane x -35.44 y -10.43 z 0.00 Default Snap Ortho Planar Osnap Record History

ES 8:53 PM 7/14/2011



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

The image shows a screenshot of the Rhinoceros software interface with the Grasshopper extension. The main window is titled 'Untitled - Rhinoceros (Educational)'. The top menu bar includes File, Edit, View, Curve, Surface, Solid, Mesh, Dimension, Transform, Tools, Analyze, Render, RhinoCAM 2D, RhinoNest, Paneling Tools, T-Splines, and Help. Below the menu bar is a command line showing an error message: 'Exception System.ArgumentException Message: An entry with the same key already exists.' The main workspace is divided into three viewports: Top, Front, and Perspective. The Top and Front views show a 3D coordinate system with red, green, and blue axes. The Perspective view shows a 3D grid. A Grasshopper window is open in the foreground, titled 'Grasshopper - unnamed*'. It has a menu bar with File, Edit, View, Arrange, Solution, Window, and Help. Below the menu bar are several toolbars: Params, Math, Sets, Vector, Curve, Surface, Mesh, Intersect, Transform, SPM, Kangaroo, Vlb, GeomGym, and Extra. The main area of the Grasshopper window contains a slider set to 0.250 and a point object labeled 'Pt'. The Properties panel on the right side of the Rhinoceros interface shows the current object's properties: Perspective, 653, 403, Perspective, 50.0, 137.381, -237.957, 158.638, Place..., 0.000, 0.000, 0.000, Place..., (none), [checked], [checked]. The bottom status bar shows 'CPlane x -35.44 y -10.43 z 0.00' and 'Snap Ortho Planar Osnap Record History'. The system tray at the bottom right shows the time as 8:53 PM on 7/14/2011.



Untitled - Rhinoceros (Educational)

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Top Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Geometry Primitive Special

195%

Slider: Slider

Properties

Name Slider

Expression

Grip Style Shape & Text

Slider accuracy

Rounding R N E O

Digits 3

Numeric domain

Min + 0 0 0 0 0 0 0 0 0 0 0 0

Max + 0 0 0 0 0 0 0 1 0 0 0 0

Range 0 0 0 0 0 0 0 0 1 0 0 0

Numeric value

0 2 5 0

0.250

OK Cancel

X Pt Pt

Y

Z

Perspective

653

403

Perspective

50.0

137.381

237.957

158.638

Place...

0.000

0.000

0.000

Place...

(none)

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x:32.39 y:-9.08 z:0.00 Default Snap Ortho Planar Onsnap Record History

8:53 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Geometry Primitive Special

195%

pos x 1 5.120

X Pt Pt
Y
Z

5.364
4.336
1.859

(none)

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x:5.98 y:2.94 z:0.00 Default Snap Ortho Planar Osnap Record History

8:55 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 5 software interface with the Grasshopper parametric modeling environment open. The main 3D viewport is in Perspective view, showing a grid floor and a 3D coordinate system with red, green, and blue axes. A green line is drawn in the 3D space. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a 'pos x 1' slider set to 5.120, which is connected to a 'Pt' (Point) component. The 'Pt' component has three input ports labeled X, Y, and Z. The X port is connected to the slider. The Y and Z ports are currently empty. The software interface includes a top menu bar, a toolbar with various modeling tools, and a bottom status bar showing the current CPlane coordinates (x:5.98, y:2.94, z:0.00) and the system clock (8:55 PM, 7/14/2011).



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Geometry Primitive Special

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

X Pt Pt

Y

Z

Perspective
1318
819
Perspective
50.0
25.984
-31.380
25.670
Place...
5.364
4.336
1.859
Place...
(none)

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:5.25 y:4.59 z:0.00 Default Snap Ortho Planar Osnap Record History

ES 8:56 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers

Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Analysis Division Primitive Spline Unit

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

Circle

Circle 3Pt

Circle 3Pt
Create a circle defined by base plane and radius.

InEllipse

Arc Arc 3Pt

Arc SED BiArc

Modified Arc Tangent Arcs

Polygon Rectangle

Rectangle 3Pt

1318
819
Perspective
50.0
25.984
-31.380
25.670
Place...

5.354
4.336
1.859
Place...

(none)

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x4.27 y6.29 z0.00 Default

Snap Ortho Planar Osnap Record History

8:56 PM
7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Division Primitive Spline Unit

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

X Pt Pt

Y

Z

P R C

Cir

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable

CPlane x:8.94 y:-9.87 z:0.00 Default Snap Ortho Planar Onsnap Record History

8:57 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Division Primitive Spline Unit

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

X Pt Pt

Y Pt

Z Pt

P Cir C

R

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable

CPlane x:10.57 y:-4.36 z:0.00 Default Snap Ortho Planar Osnap Record History

8:57 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers

Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Param Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Division Primitive Spline Unit

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

pos z 1 5.990

Pt Pt

P R C

Cir

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable

CPlane x11.22 y-5.95 z0.00 Default Snap Ortho Planar Onsnap Record History

8:58 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 5.0 software interface with the Grasshopper parametric modeling tool open. The main window is in Perspective view, showing a 3D coordinate system with a red ellipse on the XY plane. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a script with four number sliders on the left: 'pos x 1' (1.843), 'pos y 1' (2.048), 'pos z 1' (0.000), and 'pos z 1' (5.990). The 'pos z 1' slider with value 5.990 is highlighted in green. These sliders are connected to a 'Pt' (Point) component with X, Y, and Z inputs. The output of the 'Pt' component is connected to a 'Cir' (Circle) component with P, R, and C inputs. The 'P' input is connected to the 'Pt' output, and the 'R' input is connected to the 'pos z 1' slider with value 5.990. The 'C' input of the 'Cir' component is connected to the 'pos z 1' slider with value 0.000. The bottom status bar shows the CPlane coordinates (x11.22, y-5.95, z0.00) and the current view mode is 'Ortho'. The system tray at the bottom right shows the time as 8:58 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

195% Mirror
Move
Orient Move
Translate (move) an object along a vector.
Rotate
Rotate 3D
Rotate Axis

pos x 13
pos y 48
pos z 1 0.000
pos z 1 5.990

X Y Z Pt Pt
P R Cir C

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:10.34 y:-4.29 z:0.00 Default Snap Ortho Planar Osnap Record History

8:58 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D coordinate system with a red ellipse and a green line. The Grasshopper window is overlaid on the right, showing a workflow with several components: 'pos x' (value 13), 'pos y' (value 48), 'pos z 1' (value 0.000), and another 'pos z 1' (value 5.990). These are connected to a 'Pt' (Point) component with X, Y, and Z inputs. The output of the 'Pt' component is connected to a 'Cir' (Circle) component with P (Point) and R (Radius) inputs. The 'R' input is connected to the second 'pos z 1' component. The 'Cir' component has a 'C' (Circle) output. The interface includes a top menu bar, a toolbar, and a command line. The bottom status bar shows the current CPlane coordinates and various tool settings.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers
Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

pos z 1 5.990

X Pt Pt

Y

Z

P Cir C

R

G Move G

T X

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x:0.25 y:46.37 z:0.00 Default Snap Ortho Planar Onsnap Record History

8:58 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 3D software interface with the Grasshopper parametric modeling plugin open. The main 3D viewport shows a perspective view of a grid with a red circle and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow with several components: four 'pos' sliders (pos x 1, pos y 1, pos z 1, pos z 1) with values 1.843, 2.048, 0.000, and 5.990 respectively; a 'Pt' component with X, Y, and Z inputs; a 'Cir' component with P, R, and C inputs; and a 'Move' component with G, T, G, and X inputs. The bottom status bar shows various tool options like 'End', 'Near', 'Point', etc., and the system clock indicates 8:58 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

pos z 1 5.990

Pt Pt

P R Cir C

Move G T G X

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x11.83 y-7.03 z0.00 Default Snap Ortho Planar Ovsnap Record History

ES 8:59 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 3D software interface with the Grasshopper parametric modeling plugin open. The main 3D viewport shows a perspective view of a grid with a red circle and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow with several components: four 'pos z 1' sliders with values 1.843, 2.048, 0.000, and 5.990; a 'Pt' component with X, Y, and Z inputs; a 'Cir' component with P, R, and C inputs; and a 'Move' component with G, T, G, and X inputs. The bottom status bar shows various tool options and the system clock at 8:59 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

pos z 1 5.990

Pt Pt

P R Cir C

G T Move G X

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x11.83 y-7.03 z0.00 Default Snap Ortho Planar Ovsnap Record History

ES 8:59 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D coordinate system with a red circle on the XY plane. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow with several components: four 'pos' sliders (pos x 1, pos y 1, pos z 1, pos z 1) with values 1.843, 2.048, 0.000, and 5.990 respectively; a 'Pt' component with X, Y, and Z inputs; a 'Cir' component with P, R, and C inputs; and a 'Move' component with G, T, G, and X inputs. The 'Pt' component is connected to the 'Cir' component, and the 'Move' component is connected to the 'Cir' component. The bottom status bar shows the current CPlane coordinates as x11.83, y-7.03, z0.00. The system tray at the bottom right shows the time as 8:59 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point

195% 1318 819

Perspective

50.0
25.984
-31.380
25.670
Place...

5.364
4.336
1.859
Place...

(none)

Unit Z
Unit vector parallel to the world (z) axis.

Decompose
Vector XYZ
Unit Vector
Unit X
Unit Y
Unit Z
Amplitude
Angle
Cross Product
Dot Product
Reverse
Rotate
Vector ZPt
Vector Length
Vector Display

Move
G T G X

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
pos z 1 5.990

X
Y
Z
Pt
Pt

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x11.87 y-7.11 z0.00 Default Snap Ortho Planar Osnap Record History

8:59 PM
7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Grids Plane Point Vector

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

pos z 1 5.990

X Y Z Pt Pt

P R Cir C

G T Move G X

F Z V

Z.F (Number)
Unit multiplication
1 locally defined value.
1.0

0.8.0013

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable
CPlane x11.18 y-6.70 z0.00 Default Snap Ortho Planar Osnap Record History

8:00 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 3D software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D coordinate system with a red circle and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow diagram. It starts with four 'pos z 1' sliders with values 1.843, 2.048, 0.000, and 5.990. These are connected to a 'Pt' (Point) component with X, Y, and Z inputs. The output of the 'Pt' component is connected to a 'Cir' (Circle) component with P, R, and C inputs. The output of the 'Cir' component is connected to a 'Move' component with G, T, and X inputs. A 'Z.F (Number)' component is also connected to the 'Move' component. The 'Z.F (Number)' component has a tooltip that reads 'Unit multiplication 1 locally defined value. 1.0'. The bottom status bar shows the current CPlane coordinates as x11.18, y-6.70, z0.00 and the time as 8:00 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Grids Plane Point Vector

195%

pos x 1 1.843

pos y 1 2.048

pos z 1 0.000

radio cir 1 5.990

h cir 2 5.990

X Y Z Pt Pt

P R Cir C

G T Move G X

F Z V

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x:9.36 y:-9.35 z:0.00 Default Snap Ortho Planar Osnap Record History

9:02 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 5.0 software interface with the Grasshopper parametric modeling tool open. The main 3D viewport shows a perspective view of a grid with a red circle and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow diagram. It starts with four input sliders: 'pos x 1' (1.843), 'pos y 1' (2.048), 'pos z 1' (0.000), and 'radio cir 1' (5.990). These four inputs feed into a 'Pt' (Point) object. Below this, a 'h cir 2' (5.990) slider feeds into a 'Z' (Z-axis) object. The 'Pt' object's output feeds into a 'Cir' (Circle) object. The 'Z' object's output feeds into a 'Move' (Move) object. The 'Cir' object's output also feeds into the 'Move' object. The 'Move' object has three output ports labeled G, T, and X. The bottom status bar shows the current CPlane coordinates as x:9.36, y:-9.35, and z:0.00. The system tray at the bottom right shows the date and time as 9:02 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990

Pt Pt
Cir C
Move G G T X

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x 8.35 y -0.42 z 0.00 Default Snap Ortho Planar Osnap Record History

8:03 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D coordinate system with a green circle and a red cross. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow diagram. The workflow starts with three 'pos' (position) components (pos x 1, pos y 1, pos z 1) and a 'radio cir 1' component, all connected to a 'Pt' (Point) component. The 'Pt' component is then connected to a 'Cir' (Circle) component. The 'Cir' component is connected to a 'Move' component. The 'Move' component is also connected to a 'h cir 2' component. The 'Move' component has three output ports labeled G, G, and T. The 'h cir 2' component has a value of 5.990. The interface includes a top menu bar, a toolbar, a command line, and a properties panel on the right. The bottom status bar shows the current CPlane coordinates (x 8.35, y -0.42, z 0.00) and the system clock (8:03 PM 7/14/2011).



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990

radio cir 1 5.990

Pt Pt
Cir C
F N V
G G
T X
Cir C

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x10.46 y-5.73 z0.00 Default Snap Ortho Planar Osnap Record History

8:03 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D coordinate system with a green circle and a red crosshair. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a complex script. The script starts with four input parameters: 'pos x 1' (1.843), 'pos y 1' (2.048), 'pos z 1' (0.000), and 'radio cir 1' (5.990). These are connected to a 'Pt' (Point) component. The 'Pt' component is connected to a 'Cir' (Circle) component. The 'Cir' component is connected to a 'F N V' (Fillet Normal Vector) component. The 'F N V' component is connected to a 'G G' (Gaussian Gradient) component. The 'G G' component is connected to a 'T X' (Tangent X) component. The 'T X' component is connected to a 'Cir C' (Circle) component. The 'radio cir 1' parameter is also connected to this final 'Cir C' component. The final 'Cir C' component is connected to a 'Place' component. The interface includes a top menu bar, a toolbar, a command line, and a properties panel on the right.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990

radio cir 1 5.990

Pt Pt
Cir C
F N V
Move G G T X
Cir C

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x11.24 y-7.15 z0.00 Default Snap Ortho Planar Osnap Record History

8:03 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 5.0 software interface with the Grasshopper parametric modeling tool open. The main 3D viewport displays a perspective view of a grid with two red circles and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow diagram. The workflow starts with four input sliders: 'pos x 1' (1.843), 'pos y 1' (2.048), 'pos z 1' (0.000), and 'radio cir 1' (5.990). These inputs feed into a 'Pt' (Point) component. The output of the 'Pt' component connects to a 'Cir' (Circle) component. Below this, there is a 'h cir 2' slider (5.990) and another 'radio cir 1' slider (5.990). The 'h cir 2' slider connects to an 'F N V' (From Normal Vector) component. The 'radio cir 1' slider connects to a 'Move' component. The 'F N V' component connects to the 'Move' component. The 'Move' component has two outputs: 'G G' and 'T X'. The 'radio cir 1' slider also connects to a second 'Cir' component. The 'G G' output of the 'Move' component connects to this second 'Cir' component. The 'T X' output of the 'Move' component connects to the 'Cir' component. The 'radio cir 1' slider also connects to this 'Cir' component. The 'Cir' component has three outputs: 'P', 'R', and 'C'. The 'P' output connects to the 'G G' output of the 'Move' component. The 'R' output connects to the 'T X' output of the 'Move' component. The 'C' output connects to the 'Cir' component. The bottom status bar shows the CPlane coordinates (x11.24, y-7.15, z0.00) and various tool settings like 'Default', 'Snap', 'Ortho', 'Planar', and 'Osnap'. The system tray at the bottom right shows the time as 8:03 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 12 3.990

Pt
Cir
Move
Cir

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x10.72 y-6.28 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:04 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main 3D viewport displays a perspective view of a grid with two circles: a green one at the top and a red one at the bottom. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a workflow. It starts with three 'pos' sliders (x, y, z) and a 'radio cir 1' slider, all connected to a 'Pt' (Point) component. The 'Pt' component is connected to a 'Cir' (Circle) component. Below this, there are two more 'radio cir' sliders ('h cir 2' and 'radio cir 12') connected to a 'Move' component. The 'Move' component is connected to another 'Cir' component. The 'Properties' panel on the right shows the current object's coordinates and dimensions. The bottom status bar shows the current CPlane and various tool settings.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers
Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Param Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 12 3.990

h cir 2 5.990
radio cir 12 3.990

Pt
Cir
Move
Move
Cir
Cir

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x13.01 y-7.59 z0.00 Default Snap Ortho Planar Ovsnap Record History

ES 9:04 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 3D software interface with the Grasshopper parametric modeling plugin open. The main 3D viewport displays a perspective view of a grey grid plane with two circles: a green one and a red one. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a complex script. The script uses several components: 'Pt' (Point) components that take 'pos x', 'pos y', and 'pos z' values as input; 'Cir' (Circle) components that take a 'radius' value as input; and 'Move' components that take a 'height' value as input. The script is organized into three main sections, with the bottom two sections highlighted in green. The bottom-most section is enclosed in a dashed box. The status bar at the bottom of the window shows the current CPlane coordinates (x13.01, y-7.59, z0.00) and various tool settings like 'Snap', 'Ortho', 'Planar', and 'Ovsnap'. The system tray at the bottom right shows the time as 9:04 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Param Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 2 3.990

h cir 3 5.990
radio cir 3 3.990

Pt
Move
Move
Cir
Cir
Cir

End Near Point Mid Cen Int Pep Tan Quad Knot Project STrack Disable
CPlane x11.99 y-0.23 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:05 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D grid with three red circles. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a script with three parallel branches. Each branch starts with a 'Pt' (Point) component receiving 'pos x', 'pos y', and 'pos z' inputs. The first branch's point is connected to a 'Cir' (Circle) component with a 'radio cir' input. The second and third branches use 'Move' components to translate a point (from 'h cir' and 'radio cir' inputs) along the X, Y, and Z axes. The 'Move' components are connected to 'Cir' components. The bottom status bar shows the current CPlane coordinates (x11.99, y-0.23, z0.00) and various tool settings like 'Snap', 'Ortho', and 'Osnap'. The system tray at the bottom right shows the time as 9:05 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Param Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

100%

pos x 1: 1.843
pos y 1: 2.048
pos z 1: 0.000
radio cir 1: 5.990

h cir 2: 5.990
radio cir 2: 3.990

h cir 3: 5.990
radio cir 3: 3.990

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:13.40 y:-1.92 z:0.00 Default Snap Ortho Planar Osnap Record History

ES 9:05 PM 7/14/2011

The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D grid with three red circles and a green circle. The Grasshopper window shows a script with three sets of inputs: 'pos x 1', 'pos y 1', 'pos z 1', and 'radio cir 1'; 'h cir 2' and 'radio cir 2'; and 'h cir 3' and 'radio cir 3'. The script uses 'Pt' (Point) and 'Move' components to generate the circles. The bottom status bar shows the current CPlane coordinates (x:13.40, y:-1.92, z:0.00) and various tool settings like 'Snap', 'Ortho', and 'Osnap'. The system tray at the bottom right indicates the time is 9:05 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Param Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

100%

pos x 1: 1.843
pos y 1: 2.048
pos z 1: 0.000
radio cir 1: 5.990

h cir 2: 5.990
radio cir 2: 3.990

h cir 3: 5.990
radio cir 3: 5.590

h cir 4: 4.982
radio cir 4: 2.847

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:12.74 y:7.02 z:0.00 Default Snap Ortho Planar Osnap Record History

9:08 PM 7/14/2011

The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D workspace with four red circles arranged vertically. A green line is drawn from the center of the bottom circle towards the top. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a complex script. The script starts with four 'Point' (Pt) components, each receiving 'pos x', 'pos y', and 'pos z' inputs. These points are connected to 'Move' components, which also receive 'h cir' and 'radio cir' inputs. The 'Move' components are connected to 'Circle' (Cir) components. The bottom status bar shows the CPlane coordinates (x:12.74, y:7.02, z:0.00) and various tool settings like 'Snap', 'Ortho', and 'Osnap'. The system tray at the bottom right shows the time as 9:08 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers

Properties Viewport

Perspective
1318
819
Perspective
50.0
49.840
-19.384
36.252
Place...
7.098
10.656
3.287
Place...
(none)

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

100%

Mirror
Move
Orient
Rotate
Rotate 3D
Rotate Axis

h cir 2 5.990
radio cir 2 3.990

h cir 3 5.990
radio cir 3 5.590

h cir 4 4.982
radio cir 4 2.847

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x-43.93 y 82.73 z 0.00 Default Snap Ortho Planar Onsnap Record History

ES 9:08 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

100%

pos x 1: 1.843
pos y 1: 2.048
pos z 1: 0.000
radio cir 1: 5.990

h cir 2: 5.990
radio cir 2: 3.990

h cir 3: 5.990
radio cir 3: 5.590

h cir 4: 4.982
radio cir 4: 2.847

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:11.40 y:7.55 z:0.00 Default Snap Ortho Planar Onsnap Record History

9:08 PM 7/14/2011

The image shows a Rhinoceros 5.0 interface with the Grasshopper 3D parametric modeling tool. The main viewport displays a perspective view of a 3D model consisting of four red circles arranged vertically. A green line and a small 3D coordinate system are visible in the lower-left area of the model. The Grasshopper window is open, showing a complex script with various components like 'Pt', 'Circ', 'Move', and 'Relate'. The script uses numerical inputs for positions and radii to define the circles. The bottom status bar shows the current CPlane coordinates (x:11.40, y:7.55, z:0.00) and various tool settings.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

156%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 2 3.990

Pt
Cir
Move
Cir
Rotate.A (Number)
Rotate

Rotation angle in radians
Empty Number parameter

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:9.15 y:8.22 z:0.00 Default Snap Ortho Planar Osnap Record History

ES 9:09 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D workspace with a grid. Four red circles are arranged vertically, with a green line passing through the center of the bottom-most circle. The Grasshopper window is overlaid on the right side of the workspace. It contains a network of components: four 'Number' sliders for 'pos x 1', 'pos y 1', 'pos z 1', and 'radio cir 1'; two 'Number' sliders for 'h cir 2' and 'radio cir 2'; a 'Pt' component connected to the first three sliders; a 'Cir' component connected to the 'Pt' component and the 'radio cir 1' slider; a 'Move' component connected to the 'Cir' component and the 'h cir 2' slider; another 'Cir' component connected to the 'Move' component and the 'radio cir 2' slider; and a 'Rotate.A (Number)' component connected to the second 'Cir' component and a 'Rotate' component. The 'Rotate' component has three output ports labeled 'G', 'A', and 'P'. The bottom status bar shows the current CPlane coordinates (x:9.15, y:8.22, z:0.00) and various tool settings like 'Default', 'Snap', 'Ortho', and 'Osnap'. The system tray at the bottom right shows the time as 9:09 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Boolean Domain Operators Polynomials Script Trig Utl

156%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 2 3.990

Pt
Move
Cir
Rotate

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x16.63 y2.90 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:13 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main workspace is in Perspective view, showing a grid with four red circles and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a script with several components: 'Pt' (Point), 'Move', and 'Cir' (Circle). The 'Pt' component has inputs for 'pos x 1' (1.843), 'pos y 1' (2.048), and 'pos z 1' (0.000), and a 'radio cir 1' input (5.990). The 'Move' component has inputs for 'h cir 2' (5.990) and 'radio cir 2' (3.990). The 'Cir' component has inputs for 'P' and 'R'. A 'Rotate' component is also visible, with inputs for 'G', 'A', 'P', and 'X'. The interface includes a menu bar, a toolbar, a command line, and a properties panel on the right. The bottom status bar shows the current CPlane coordinates (x16.63, y2.90, z0.00) and the software version (0.8.0013).



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Boolean Operators Polynomials Script Trig Utl

156%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990

h cir 2 5.990
radio cir 2 3.990

Pt Pt
Cir C
F(x) r
Rotate
Move
Z V

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x15.69 y3.86 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:13 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main workspace is in Perspective view, showing a grid with four red circles and a green line. The Grasshopper window is titled 'Grasshopper - unnamed*' and contains a script with several components: 'Pt' (Point) receiving 'pos x 1', 'pos y 1', and 'pos z 1'; 'Cir' (Circle) receiving 'radio cir 1' and the output of the 'Pt' component; 'F(x)' (Function) receiving the output of the 'Cir' component; 'Move' (Move) receiving 'h cir 2' and 'radio cir 2'; and another 'Cir' (Circle) receiving 'radio cir 2' and the output of the 'Move' component. The 'Rotate' component is also present, receiving the output of the 'Cir' component. The bottom status bar shows the CPlane coordinates (x15.69, y3.86, z0.00) and the time 9:13 PM on 7/14/2011.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2D RhinoNest Paneling Tools T-Splines Help

Exception System.ArgumentException
Message: An entry with the same key already exists.

Command:

Perspective

Expression function list

Name	Signature	Description
Log10	Log10(x)	Returns the base 10 logarithm of a specified number
Max	Max(x, y, z, ...)	Returns the maximum value in a set of numbers
Mean	Avg(x, y, z, ...)	Returns the mean (average) of a set of numbers, vectors or planes
Min	Min(x, y, z, ...)	Returns the minimum value in a set of numbers
Minkowski	Minkowski(Distance(x, y, ...), p)	Returns the p-order Minkowski distance between two numbers or vectors
Power	Power(x, y)	Returns a specified number or vector raised to the specified power
Prod	Prod(x, y, z, ...)	Returns the product of a set of numbers
Rad	Rad(x)	Converts an angle in degrees to radians
Replace	Replace(s, a, b)	Replaces all occurrences of [a] in [s], with [b]
Right	Right(s, i)	Returns the [i] characters on the right hand side of the string
Round	Round(x, d)	Rounds a floating point number to the specific decimal places
Sin	Sin(x)	Returns the sine of an angle
Sinh	Sinh(x)	Returns the hyperbolic sine of an angle
Sqrt	Sqrt(x)	Returns the square root of a specified number
StartsWith	StartsWith(s, a)	Test whether [s] starts with [a]
SubString	SubString(s, i, l)	Returns a substring based on start char index and length
Sum	Sum(x, y, z, ...)	Returns the sum of a set of numbers or vectors
Tan	Tan(x)	Returns the tangent of an angle
Tanh	Tanh(x)	Returns the hyperbolic cosine of an angle
UCase	UCase(s)	Converts all characters in a String to their upper case equivalent

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Boolean Domain Operators Polynomials Script Trig Utl

156%

Expression Designer

Functions: \int , \sum , \prod , \bar{A} , \bar{U} , \bar{G}

Constants: e , π , ϕ , $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $|x|$, $|y|$, $|z|$

Operators: $=$, \neq , \approx , $<$, $>$, \leq , \geq , \cdot , \times , \div , $\%$, N^K , A^2 , A^3 , A^y , $\&$, α , $m!$, \cdot , \perp , \leftrightarrow , \ominus , $|v|$

Expression: $x: Nu.11$

Variables:

Errors: Syntax error: Invalid expression: Premature end of expression

Preview OK Cancel

Rotary

Properties

Perspective
1318
819
Perspective
50.0
45.873
-18.633
36.693
Place
6.022
10.963
5.190
Place
(none)
[x]
[y]
[z]

ES 9:14 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McLee\Rhino\Rhino4\AutoSave\Rhino4\AutoSave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Boolean Operators Polynomials Script Trig Utl

156%

Expression Designer

Functions $\{x,y,z\} \{r,i\} \Sigma(\cup) \Pi(\cup) \overline{A}(\cup) \cup(\cup) G(\cup)$ $f:\mathbb{N} \rightarrow \mathbb{R}$

Constants $e \pi \phi \frac{1}{2} \frac{1}{3} \frac{1}{4} \frac{1}{5} |x| |y| |z|$

Operators $= \neq \approx < > \leq \geq .x .y .z .O .F .i$

Operators $+ - \times \frac{\%}{B} N^K A^2 A^3 A^y \& \alpha n! \cdot \perp \leftrightarrow \ominus [v]$

Expression Rad(x)

Variables x: Null

Errors Syntax error: Function Rad can only be called with a numeric parameter

Preview OK Cancel

h cir 2 5.990 F Z V T Mo X P R Cir

radio cir 2 3.990

Rotate

Perspective 1318 819 Perspective 50.0 45.873 -18.633 36.693 Place 6.022 10.963 5.190 Place (none) [x] [y] [z]

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable CPlane x15.69 y4.08 z0.00 Default Snap Ortho Planar Onsnap Record History ES 9:14 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Boolean Operators Polynomials Script Trig Utl

156%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990
rot cir 1 30.379
h cir 2 5.990
radio cir 2 3.990

rot cir 1 (Number)
Numeric slider for single values
Floating point accuracy
Lower limit: -45.000
Upper limit: 45.000
Value: 30.379
Factor: 84%

Pt Pt
Cir C
F(x) r
Move G T X
Cir C
Rotate G A P X

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:22.80 y:10.88 z:0.00 Default Snap Ortho Planar Onsnap Record History

ES 8:15 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Colour Gnds Plane Point Vector

156%

Plane Components XY Plane
XZ Plane YZ Plane
Lin XZ Plane Line + Pt
World XZ plane Plane 3Pt
Plane Plane Normal
Plane Fit Plane Offset
Plane Origin
Align Plane Align Planes
Plane CP Rotate Plane

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990
rot cir 1 30.379
h cir 2 5.990
radio cir 2 3.990

P R Cir C
G A Rotate G
F(x) r
G T Move G
F N V X
P R Cir C

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x12.45 y6.07 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:16 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Colour Gnds Plane Point Vector

156%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990
rot cir 1 30.379

h cir 2 5.990
radio cir 2 3.990

Pt Pt
Cir C
XZ P
XZ (XZ Plane)
World XZ plane
Move G T X
Cir C

Rotate G A P X

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x13.37 y4.72 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:17 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 4.0 software interface with the Grasshopper parametric modeling tool open. The main viewport displays a perspective view of a 3D model consisting of four red circles stacked vertically along the z-axis. A green line passes through the center of the circles. The Grasshopper window is open, showing a script with several components: 'Pt' (Point) components for the first three circles, 'Cir' (Circle) components for all four circles, a 'Move' component for the second circle, and a 'Rotate' component for the top circle. The script uses sliders for parameters like position (pos x, y, z), radius (radio cir), and rotation (rot cir). The 'XZ (XZ Plane)' component is highlighted in yellow. The bottom status bar shows the current CPlane coordinates (x13.37, y4.72, z0.00) and various tool settings like 'Snap', 'Ortho', and 'Osnap'.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McLee\Rhino\Rhino4\AutoSave\Rhino4\Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Grids Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990
rot cir 1 30.379

h cir 2 5.990
radio cir 2 3.990

h cir 3 5.990
radio cir 3 5.590

PA Pt
Cir C
XZ
F(x)
Move
Rotate

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x13.28 y5.30 z0.00 Default Snap Ortho Planar Onsnap Record History

ES 9:17 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 4.0 software interface with the Grasshopper parametric modeling tool open. The main 3D viewport displays a perspective view of a grey grid with four red circles arranged vertically. A green curve is drawn across the circles, and a small green leaf-like object is positioned on it. The Grasshopper window is open in the foreground, showing a complex script. The script uses various components: 'Pt' (Point) components for defining positions, 'Cir' (Circle) components for defining circles, 'Move' components for translating objects, and 'Rotate' components for rotating objects. It also includes 'XZ' and 'F(x)' components for coordinate system manipulation and function evaluation. The script is connected to the 3D viewport, where the resulting geometry is visible. The bottom of the screen shows the Windows taskbar with various application icons and the system clock.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhino4\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Colour Gnds Plane Point Vector

125%

pos x 1 1.843
pos y 1 2.048
pos z 1 0.000
radio cir 1 5.990
rot cir 1 30.379

h cir 2 5.990
radio cir 2 3.990
rot cir 1 30.379

h cir 3 5.990
radio cir 2 5.590

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x12.76 y4.98 z0.00 Default Snap Ortho Planar Ovsnap Record History

ES 9:18 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

80%

pos.x.1 1.843
pos.y.1 2.048
pos.z.1 0.000
radio.cir.1 5.990
rot.cir.1 30.379

h.cir.2 5.990
radio.cir.2 3.990
rot.cir.2 30.379

h.cir.3 5.990
radio.cir.3 5.590
rot.cir.3 30.379

h.cir.4 4.982
radio.cir.4 2.847
rot.cir.4 30.379

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x14.35 y4.82 z0.00 Default Snap Ortho Planar Ovsnap Record History

ES 8:19 PM 7/14/2011

The image shows a screenshot of the Rhinoceros 4.0 software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D model consisting of four vertical, slightly curved columns. Each column is defined by a red circular base and a green line representing its axis. The Grasshopper window is open in the foreground, showing a complex script with various components like 'Point', 'Move', 'Rotate', and 'F(x)'. The script is organized into four rows, each corresponding to one of the columns in the 3D model. The parameters for each row are: Row 1: pos.x.1 (1.843), pos.y.1 (2.048), pos.z.1 (0.000), radio.cir.1 (5.990), rot.cir.1 (30.379); Row 2: h.cir.2 (5.990), radio.cir.2 (3.990), rot.cir.2 (30.379); Row 3: h.cir.3 (5.990), radio.cir.3 (5.590), rot.cir.3 (30.379); Row 4: h.cir.4 (4.982), radio.cir.4 (2.847), rot.cir.4 (30.379). The bottom status bar shows the current CPlane coordinates (x14.35, y4.82, z0.00) and the system clock (8:19 PM, 7/14/2011).



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

80%

pos.x.1 1.843
pos.y.1 2.048
pos.z.1 0.000
radio.cir.1 5.990
rot.cir.1 30.379

h.cir.2 5.990
radio.cir.2 3.990
rot.cir.2 30.379

h.cir.3 5.990
radio.cir.3 5.590
rot.cir.3 30.379

h.cir.4 4.982
radio.cir.4 2.847
rot.cir.4 30.379

Cir (Circle)
Create a circle defined by base plane and radius.

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x16.78 y3.05 z0.00 Default Snap Ortho Planar Osnap Record History

ES 8:19 PM 7/14/2011

Detailed description: The image shows a screenshot of the Rhinoceros 4.0 software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D workspace with a grid. Four sets of circles are visible, each defined by a red base plane and a green circle. The circles are arranged in a vertical column. The Grasshopper window is open in the foreground, showing a complex script with various components like 'Pt', 'Move', 'Cir', 'F(x)', 'XZ', and 'Rotate'. The script is organized into four rows, each corresponding to one of the circle sets in the 3D view. The 'Cir' component is highlighted, showing its tooltip: 'Cir (Circle) Create a circle defined by base plane and radius.' The bottom status bar shows the current CPlane coordinates (x16.78, y3.05, z0.00) and the system clock (8:19 PM, 7/14/2011).



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoTest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McNeel\Rhinoceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers Viewport Properties

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vrb GeomGym Extra

Colour Gnds Plane Point Vector

80%

pos.x.1 1.841 Disable Preview on selection
pos.y.1 2.048
pos.z.1 0.000
radio.cir.1 5.990
rot.cir.1 30.379

h.cir.2 5.990
radio.cir.2 3.990
rot.cir.2 30.379

h.cir.3 5.990
radio.cir.3 5.590
rot.cir.3 30.379

h.cir.4 4.982
radio.cir.4 2.847
rot.cir.4 30.379

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x:1243 y:6.36 z:0.00 Default Snap Ortho Planar Osnap Record History

ES 9:20 PM 7/14/2011

The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main window displays a perspective view of a 3D workspace with several red and green curves and surfaces. The Grasshopper window is overlaid on the right, showing a complex network of components including 'Move', 'Curve', 'Rotate', and 'F(x)'. The components are connected by lines, and various numerical values are displayed next to the input ports. The interface includes a top menu bar, a toolbar, and a status bar at the bottom.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McLee\Rhinceros\4.0\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Layers - All Layers
Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help
Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Freeform Primitive UI

100%
4Point Surface
Extrude
Extrude Linear
Offset
Pipe
Edge Surface
Loft
Loft Options
Revolution
Surface From Points
Sweep2
Extrude Point
Offset Loose
Planar Surf
Loft
Partial Revolution
Sweep1

Create a lofted surface through a set of section curves.

pos x.1 1.843
pos y.1 2.048
pos z.1 0.000
radio cir.1 5.990
rot cir.1 30.379
h cir.2 5.990
radio cir.2 3.990
rot cir.2 30.379
h cir.3 5.990
radio cir.3 5.590
rot cir.3 30.379
h cir.4 4.982
radio cir.4 2.847
30.379

Move
Circ
F(x)
Rotate
Loft

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x11.16 y7.39 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:20 PM 7/14/2011



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Autosaving file as C:\ProgramData\McLee\Rhino\Rhino4\AutoSave\Rhino4Autosave.3dm
Autosave completed successfully
Command:

Perspective

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help
Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

100%

pos x.1 1.843
pos y.1 2.048
pos z.1 0.000
radio cir.1 5.780
rot cir.1 -5.297
h cir.2 5.990
radio cir.2 2.466
rot cir.2 -5.297
h cir.3 8.007
radio cir.3 5.685
rot cir.3 -6.107
h cir.4 4.962
radio cir.4 2.847
-19.080

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
CPlane x17.47 y-12.57 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:22 PM 7/14/2011

The image shows a screenshot of the Rhinoceros software interface with the Grasshopper parametric modeling tool open. The main 3D viewport displays a red, hourglass-shaped mesh object. The Grasshopper window shows a complex script with various components like 'Pt', 'Move', 'Curve', 'Rotate', and 'Loft'. The script is organized into columns: 'Params' (input sliders), 'Math' (operators), 'Sets' (lists), 'Vector' (directional tools), 'Curve' (curve creation), 'Surface' (surface creation), 'Mesh' (meshing), 'Intersect' (boolean operations), 'Transform' (movement and rotation), 'SPM' (Surface Parametric Modeling), 'Kangaroo' (physics simulation), 'Vlb' (visibility), 'GeomGym' (geometric logic), and 'Extra' (miscellaneous). The 'Loft' component at the end of the script is connected to the final mesh object in the viewport. The bottom status bar shows the current CPlane coordinates and various tool settings.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Command: _Move
Point to move from (Vertical-No):
Point to move to <1.00>
Command:

Perspective

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help

Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Freeform Primitive UI

100%

pos.x:1 1.843
pos.y:1 2.048
pos.z:1 0.000
radio.cir.1 5.780
rot.cir.1 -5.297

h.cir.2 5.990
radio.cir.2 2.466
rot.cir.2 -5.297

h.cir.3 8.007
radio.cir.3 5.685
rot.cir.3 -6.107

h.cir.4 4.962
radio.cir.4 2.847
rot.cir.4 -19.080

0.8.0013

End Near Point Mid Cen Int Perp Tan Quad Knot Project Stack Disable
CPlane x10.37 y-22.83 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:22 PM 7/14/2011

The image shows a screenshot of the Rhinoceros 3D software interface with the Grasshopper parametric modeling tool. The main viewport displays two 3D models of a hyperboloid of one sheet. The left model is a solid black object, while the right model is a green wireframe mesh. The Grasshopper script is visible in the center-right, showing a series of input parameters (pos.x, pos.y, pos.z, radio.cir, rot.cir) for four different circular profiles. These are connected to a sequence of operations: 'Move' (Z), 'Circle' (C), 'Rotate' (R), and 'Fillet' (F). The final output is a 'Left' object. The interface includes a top menu bar, a toolbar, and a bottom status bar with system information.



Untitled - Rhinoceros (Educational) - [Perspective]

File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render RhinoCAM 2.0 RhinoNest Paneling Tools T-Splines Help

Command: _Move
Point to move from (Vertical-No):
Point to move to <19.39>
Command:

Perspective

Layers - All Layers
Properties Viewport

Grasshopper - unnamed*

File Edit View Arrange Solution Window Help
Params Math Sets Vector Curve Surface Mesh Intersect Transform SPM Kangaroo Vlb GeomGym Extra

Analysis Freeform Primitive UI

100%

pos.x:1 1.843
pos.y:1 2.048
pos.z:1 0.000
radio.cir.1 5.780
rot.cir.1 -5.297

h.cir.2 2.124
radio.cir.2 2.486
rot.cir.2 -5.297

h.cir.3 10.000
radio.cir.3 5.685
rot.cir.3 10.109

h.cir.4 4.982
radio.cir.4 8.847
25.515

Grasshopper workflow diagram showing a series of Move, Rotate, and other geometric operations connected to a final Left output.

End Near Point Mid Cen Int Perp Tan Quad Knot Project Stack Disable
CPlane x13.28 y-29.92 z0.00 Default Snap Ortho Planar Osnap Record History

ES 9:23 PM 7/14/2011