GDL Toolbox 2
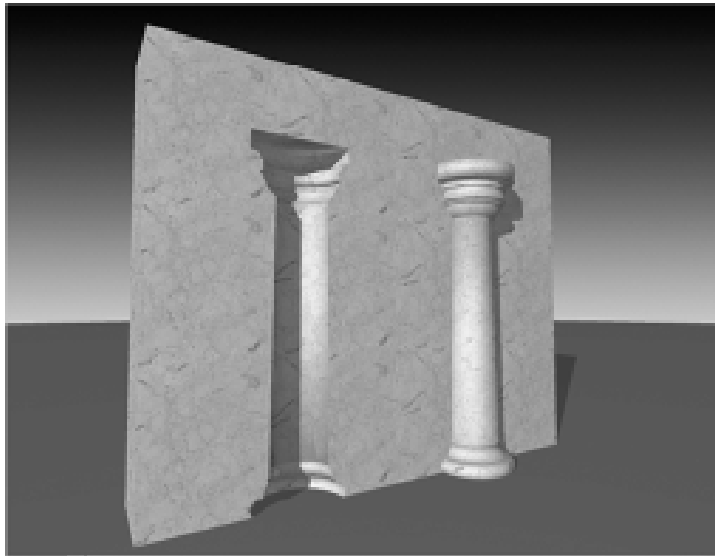
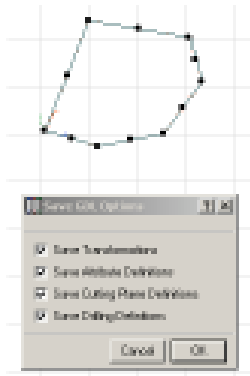## Reference Manual

New Features

New Save GDL command

Selected GDL Toolbox elements can be exported into simple GDL scripts. During the export process, the content of the export can be influenced. The following information can be exported with the element's geometry:

o   Position of the Origin

o   Transformations

o   Attribute Definitions

o   Cutting Information

The export process generates 3D GDL script. This script can be post processed using the standard ArchiCAD tools. This feature is a long awaited solution for GDL friends.

Enhanced Save Object command - Managing Bool Operations of ArchiCAD 8
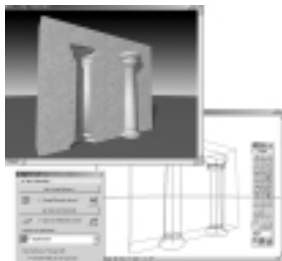
ArchiCAD 8 supports a nice range of Bool Operations. Using the standard ArchiCAD tools the geometry of all elements may be modified using other elements. GDL Toolbox elements may also be modified using these functions, and can also work as operator elements.

The new Save Object command of GDL Toolbox 2.0 supports these new functions and features. The selected model will be saved as a GDL Object, with all the Bool information stored in the ArchiCAD Project.

Loading these saved Objects will restore the original ArchiCAD elements and conditions as in the previous version.

New 3D surface definition possibility

The new surface definition is based on a set of polylines. The new surface will be spanned between these polylines. The number of polylines is not restricted. This new feature provides a flexible way of drawing complicated geometries. The new interactive editing of these elements now provides the simple modification of the surface gaps. This feature opens new dimensions in modeling irregular forms.

New Polyline definition possibilities

GDL Toolbox now offers a set of predefined parametric shapes beside the well-known polyline definition. Spiral, Ellipse, and other regular forms can be quickly drawn. The list of these geometries is expandable.

Bending, Filleting and Chamfering Prisms

The Prism tool is enhanced by defining bent filleted or chamfered prisms in the well-known dialog box. Existing or converted prisms may also be changed into these new forms.

Masking edges and surfaces

Using the new Mask dialog boxes, you can easily modify the status and Mask codes of existing elements. That means you can easily make edges surfaces of prisms and other segmented elements invisible.

In the Standard ArchiCAD Object settings dialog box you can easily modify the mask values of the complex GDL Toolbox elements.

1. Chapter - Introduction

GDL Toolbox is an ArchiCAD Add-On application, which enables ArchiCAD Users to have access to the geometrical options offered by GDL programming without any previous knowledge of GDL or programming, based exclusively on their knowledge of ArchiCAD and geometry.

GDL Toolbox provides solutions for two main tasks:

1. It supplements the Architectural tools of ArchiCAD with intelligent 2D/3D geometrical elements;

2. It allows the ArchiCAD Users smart and interactive generating and editing of most sophisticated GDL objects on the well-known editing environment of ArchiCAD.

Launching GDL Toolbox

If GDL Toolbox is properly installed, a new menu command appears in ArchiCAD's menu line.

To launch the program select **GDL-Toolbox/Show Palette** command. The GDL Toolbox palette appears.
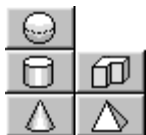
2. Chapter - Basics

Tools and menus of GDL Toolbox

Its own toolbox and menu items can control GDL Toolbox.

The toolbox contains the geometrical elements, the transformations and some definition aids. These tools work similar to the architectural tools of ArchiCAD.

The following tools are available from the toolbox of the program:

Basic elements (construction elements):

- point
- line
- arc /circle
- polygon (plain with linear and curved segments)
- 3D polyline (definition of straight and curved)

Primitive bodies:

- sphere (slice, sector and all of their combinations)
- cylinder (regular, oblique, sector and all of their combinations)
- cone (regular, oblique, sector and all of their combinations)
- pyramid (regular, oblique)
- prism (regular, oblique)

Complex body- and surface-definitions:

- tube-based elements (also with built-in circle, semi-circle, rectangular cross-sections)
- elements generated by rotation (also with built-in circle, semi-circle, rectangular cross-sections)
- 3D surface (surface defined by two 3D polylines)
- 3D text (applied on sphere, cylinder or plane)

Element transformations:

Element transformations modify the spatial location and direction of GDL Toolbox elements:

- mirror (to a center point, to a line, to a plane)

- rotate (around a center point, around an axis)

- drag

Transformations can be defined on the floor plan interactively, or you can predefine rotation angles within the toolbox. The number of transformations can also be set on the toolbox.

Control buttons

The toolbox contains some buttons, which control the work with GDL Toolbox**:**

Using the **Dialog** button on the very top of the toolbox, you can turn on or off the element dialog boxes.

Using the two buttons in the lower part of the toolbox you can change the conditions of the interactive element definition and modification:

- Input Modifier on/off,

- z Gravity on/off,

- Using the third button in the lower part of the toolbox you can get information about the z coordinates (heights) of the nodes.

The GDL Toolbox menu contains the following operations

 The editing operations are used for specifying special spatial places quickly and interactively, based on the selection of existing elements
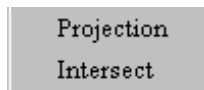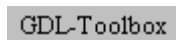
Projection:

- Perpendicular projection of a point to a line,

- perpendicular projection of a point to a plane,

- perpendicular projection of a line to a plane.

Intersection:

- intersection of two lines

- intersection of a line and a plane

- intersection line of two planes

Saving and Loading ArchiCAD Library Parts:

Selected sets of GDL Toolbox elements can be saved as ArchiCAD Objects. These objects can later be opened and GDL Toolbox will replace them with their original basic components again for further editing or modifications.
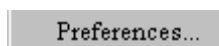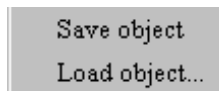
Definition and modification of elements

The GDL Toolbox elements can be created and also be modified in ArchiCAD's 3D space using the ArchiCAD Floor plan window. The definition and modification of the GDL elements works very similar to the ArchiCAD elements. You can define the spatial position of the elements by clicking on the floor plan, and entering the height of the points. The elements are represented in both the 2D and the 3D windows.
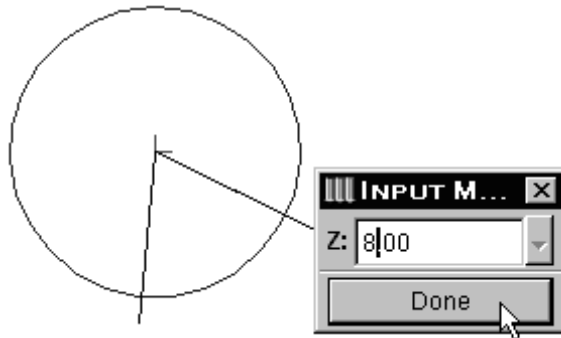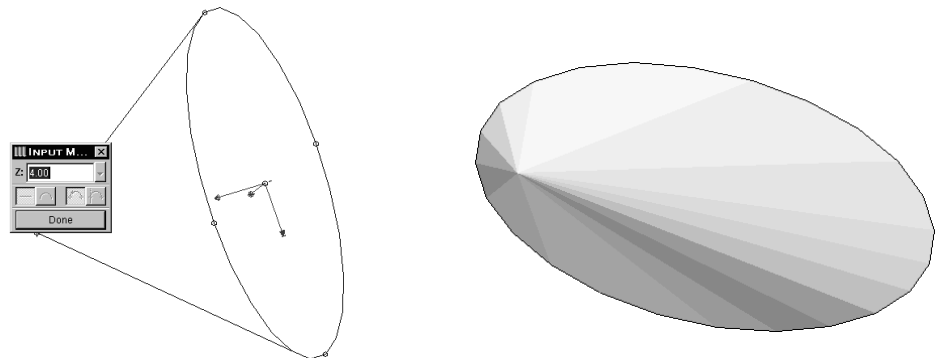
Existing elements can be modified using the same methods as they have been created. These elements can be modified on the Floor Plan interactively or in their dialog boxes.

Terms

The 3D Space of GDL Toolbox

As opposed to the limited 3D space of ArchiCAD the GDL Toolbox space has been opened up. Elements can be generated at any position in the space, with any orientation. Points, planes and lines, which can be drawn in the free 3D space, are used for defining spatial positions. The Input Modifier palette can influence the definition of the spatial position of elements on the ArchiCAD space.

The position of existing elements can be modified with 3D transformation commands.

The program recognizes the 3D positions of the elements' hotspots, therefore, due to the floor plan gravity function, the cursor jumps to the 3D position of the given point. With the help of this function, 3D nodes of an existing element may help in the definition of new elements.
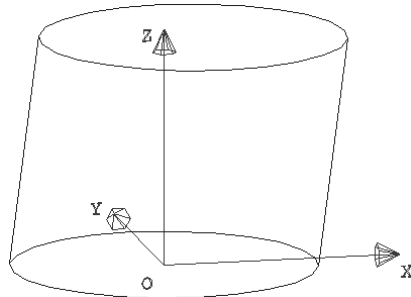
Global coordinate system

ArchiCAD uses fixed coordinate system for storing the elements' positions. This coordinate system is called global coordinate system.

Its most important feature is that its position never changes so it is capable of defining the elements' position unambiguously. The x-axis of global coordinate system is always horizontal and it points from left to right on the ArchiCAD Floor Plan. The y-axis is always horizontal and points from the

bottom to the top of the monitor. The z-axis is vertcial, perpendicular to the plane of the Floor Plan (that is your screen) and points outwards. During the definition of the GDL Toolbox elements the position of points (clicks) - including the definition of heights - are interpreted in this global coordinate system.

Local coordinate system

The placed GDL Toolbox elements are in the ArchiCAD Global space. But each GDL Toolbox element has a local coordinate system, which contains the element's geometrical definition relative to its origin and axes.


ArchiCAD defines the GDL Toolbox elements by the place of their local coordinate system and the orientation of their axes.
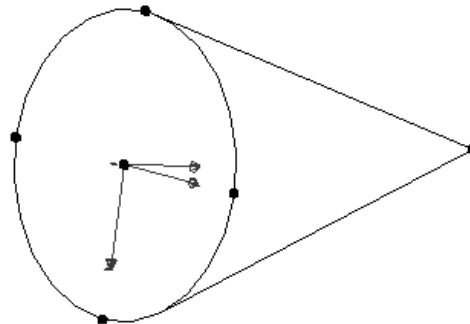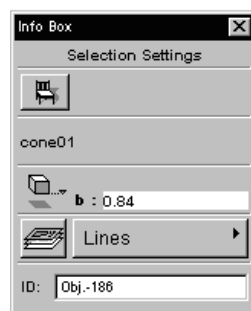
The height values in the ArchiCAD Info box show the absolute height of the elements' local origin. The local coordinate systems of the elements can be displayed by enabling the Coordinate system button in the elements' dialog boxes.

These coordinate systems may help in making a quick overview of the positions of the elements both on the Floor Plan and in the 3D window.
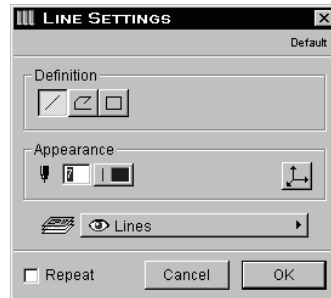
Points
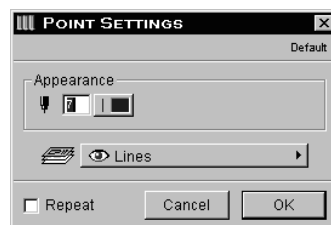
Points enable you to define spatial places. Points are the simplest GDL Toolbox element, which are displayed as small crosses depending on their settings. We call points or nodes as well on, which the z gravity operates; but each click is also called to be a point. A point can be defined with three (x, y, z) values in the global coordinate system.

Vector

Vector is a section, which can be defined by two points. The direction of a vector is determined by the order of the two points. A vector points from the first click to the second one.
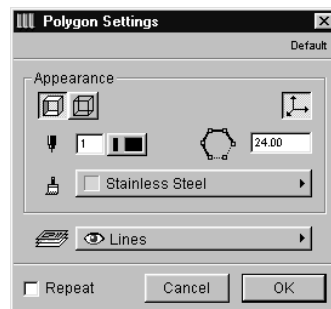
The line element of GDL Toolbox can be considered as vector.

Plane

Three points can define a plane minimally. A plane has two sides. The side from which the z-axis of the plane's coordinate system 'stands out' is called positive side. In GDL Toolbox if you generate a plane (Polygon, Circle, Arc), the program automatically produces a positive- plane after the three definition points are entered. (This means that the generated plane's local z axis points upwards.) If a plane is vertical, the local z-axis is depending on the definition direction of the points (anticlockwise means positive, clockwise means negative).

The polygon element of GDL Toolbox can be considered as a plane.

Anticlockwise and Clockwise directions

Three points can define a plane. The x and y axes of the created plane's local coordinate system lie in the plane. The z-axis is perpendicular to the plane and it may point to both side of the plane. The orientation of the plane is determined by the order of the three points' definition. If you define the three points anticlockwise (that is in positive direction) on the horizontal plane, the z-axis will point upwards. If in the opposite (negative) direction, it will point downwards.

In order to make the elements' definition easier, during the creation of Polygon, Circle and Arc elements - independently of the points' order - the local z coordinate axis stands always upwards. The anticlockwise and clockwise directions play an important role at transformations.
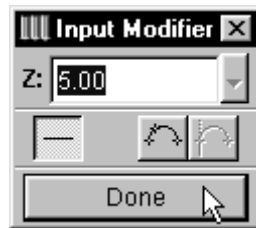
Z-Value, Z-Gravity

The ArchiCAD floor plan is a horizontal plane of the Virtual Building. On this horizontal plane you can define the x and y coordinates of a point (by a click) in the ArchiCAD global coordinate system. You can enter the z value of the clicked point with the help of the Input modifier, depending on the program's settings. It means, that each click in GDL Toolbox has two parts:

• the click on the Floor Plan and the

• definition of z value.

The program provides several possibilities for the quick and easy definition of the height values:

•You can enter them one by one after each click by typing into the Input modifier's z field.

• If you want to place the points on the same horizontal plane, you can turn off the Input modifier, In that case each further click will be input with the last entered z value.

• If you enable the z gravity and click over a node of an existing GDL Toolbox or ArchiCAD 3D element, GDL Toolbox will recognize the height of the clicked point and will automatically input the point at this height. If the given element has several nodes in the point of the click, the Input modifier will appear and offer the height of all nodes lying in this point.
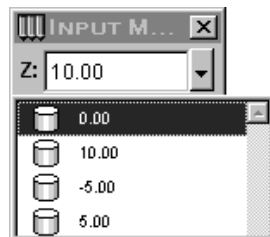
You can enable or disable the Input modifier or the z gravity at any time, using the **Alt+Ctrl+1** (Input modifier) and **Alt+Ctrl+3** (z gravity) shortcuts.

Detailed description of these functions is described later.

Polyline
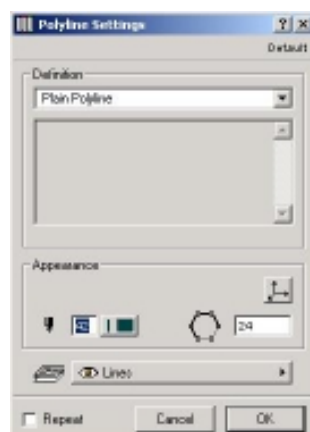
A special geometrical element has been introduced in GDL Toolbox: the *polyline*. It enables you to create open or closed spatial elements, which can contain both curved, and straight segments. The polyline is not only an independent element of GDL Toolbox, but it is an important definition element of the complex geometries.

You find detailed description in the Tools *chapter.*

Transformation

The transformations are special editing methods, which change the elements' spatial position, but do not change their geometry. ArchiCAD also applies transformations (Drag..., Rotate..., Mirror...), but these transformations can be used only in restricted space (in the x-y plane and around z axis).

GDL Toolbox allows you to implement transformations in the free space on elements created by it. It means, existing elements can be rotated around optional spatial points or axes or can be mirrored to optional spatial points, lines or planes.

> *You find detailed description in* Chapter 4; Modifying elements' positions.

3. Chapter – Concept & Techniques

Generating Elements

GDL Toolbox elements can be drawn in a very similar way to ArchiCAD elements. You can start drawing an element by clicking on one of the tools button. Depending on the state of the Dialog button (at the very top of the toolbox) the Settings dialog box of the element will appear, or you can start defining the element on the floor plan. If the dialog is skipped, the last used settings will be used at the definition of the elements.

The parameters of the element need to be defined in the Settings Dialog Box:
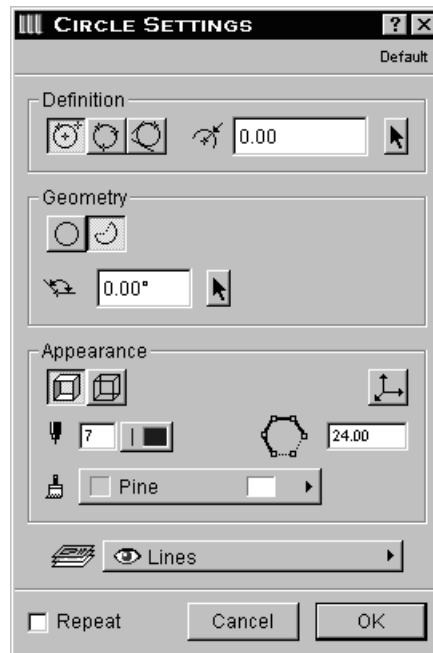
The geometrical parameters of an element should be defined on the floor plan, or in the 3D window.

Parallel clicking on the floor plan, the z coordinate value of the defined point needs to be entered. This enables you, when drawing elements to define the points exact in the 3D space.

For defining complex geometries, already existing geometrical elements can be used (e.g. by selecting two existing polylines and clicking on the 3D surface tool; a surface will be spanned between them).
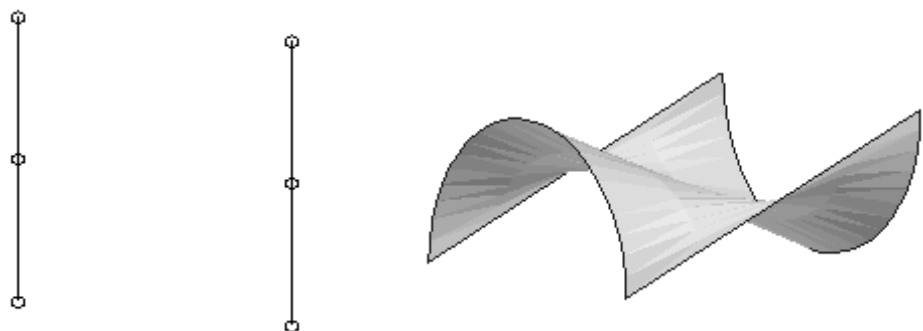

Similarly to ArchiCAD's SPACE + click, GDL Toolbox is capable of converting one of its elements into another type of element, on the basis of its geometry. (e.g. by selecting a circle and clicking on the CONE tool, the program generates a cone in the place of the circle.).
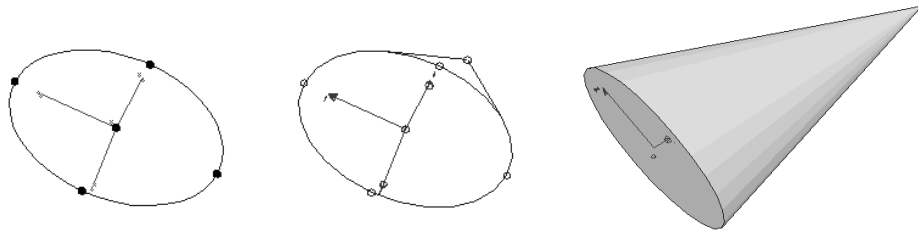
The Tools chapter contains detailed description about the parameters and the definition of the elements.

Modifying Elements

The modification of previously drawn elements, work almost the same way as in the case of ArchiCAD. The geometry of the selected element can be modified interactively on the floor plan.
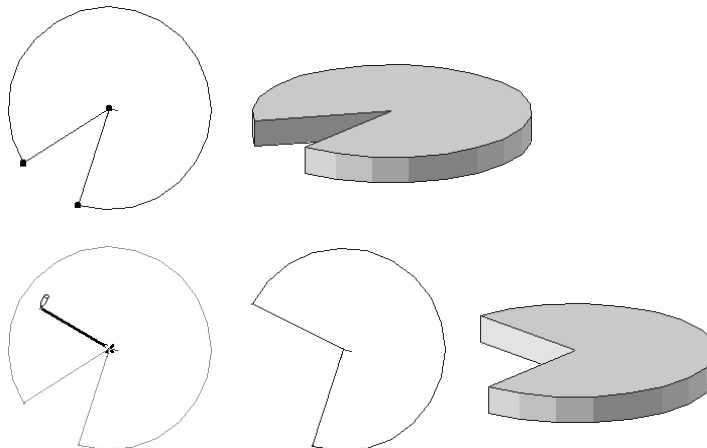

The not geometrical parameters of the elements can be modified in the settings dialog boxes the same way as in the case of ArchiCAD elements.

The spatial position of an element can be modified by transformations.

If you select an element and click on the element's tool in the toolbox, depending on the state of the Dialog button ▓ Dialog ▓ (at the very top of the toolbox) the selected element will be edited using the dialog box, or interactively on the floor plan.

If you edit an element interactively on the floor plan, the element's colour changes, it becomes dashed and its geometry can be modified interactively. Clicking the ArchiCAD Cancel button, or clicking on a blank space can finish the interactive modification.
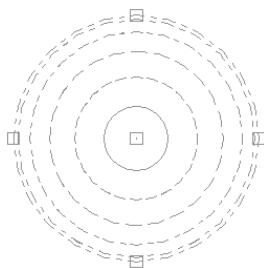
The exact description of the modification of elements can be found in the Tools chapter.

Modifying elements' position

You can modify the position of GDL Toolbox elements by using the ArchiCAD editing or the GDL Toolbox transformation functions. In the same way as in ArchiCAD these operations work on selected elements. Using the ArchiCAD editing operations you can make only restricted transformations. During transformations the elements do not lose their position relative to x-y plane. GDL Toolbox handles the elements' placement and position in the free 3D space. To define the spatial placement needs more information than the placement definition on a plane.

You can set the geometrical information for the transformations on the floor plan or in the 3D window, or numericaly in the toolbox.

Axes, points and angles can be determined on the floor plan, and in the 3D window by defining points and vectors, for dragging, rotating and mirroring elements in the space.

For more details see Transformations *in chapter 4.*

Defining the height of the points, the z gravity

The *Input modifier* serves for specifying the height values of the point definitions (clicks). on the floor plan.
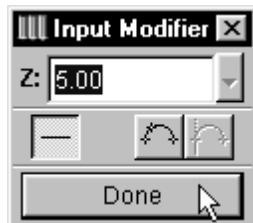
You can define the height of the points in the first line of the Input Modifier window:

The z value is also displayed on the Toolbox. This gives feedback about the positioning of the next click. This value can also be changed before the interactions. Modifying this value has the same effect as using the Input modifier.


In the *z field* the point's height is handled relative to the global origin. With the magnet button the *z gravity* can be switched which will take effect from the next click.

The Input modifier will be pop up after each click if the button representing the Input modifier is switched on at the bottom of the toolbox.

If the button is turned off, after the clicks the Input modifier will not appear and the clicks will be taken in the last defined height. This feature can be switched by clicking on the button, if no operation is going on. During an operation you can switch on and off the Input modifier using the Alt+Ctrl+1 shortcut.

If the *z gravity* is enabled and you click on a node of a 3D element, GDL Toolbox will find the point's height and will input the new point in the given point's height without displaying the Input modifier. If there are several nodes at the place of click, the Input modifier appears and all the available heights will be shown. You can select the desired height from a pop-up palette in the place of z: field.
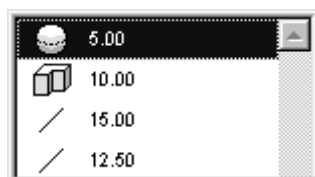
Beside each height value the icon of the related element is displayed by clicking on any of the values it will be entered into the z-field.. If the

provided heights are not appropriate, you can redefine it. You can get back the values if you press the button next to the z field.

The button representing *z gravity* can be found in the lowest row of the toolbox. This button can be switched by clicking on it if no operation is on. During an operation you can switch the z gravity using the **Alt+Ctrl+3** shortcut.

Defining curved segments

The second line of the Input modifier allows you to specify curved segments for a polygon or a polyline:

After drawing a segment (clicking its second point) you can specify by the first pair of buttons if the drawn segment should be curved or straight. With the help of the second pair of buttons you can choose, if the drawn curved segment should be tangential to the previous segment or broken. If you choose straight or curved-tangential segment, exiting the Input modifier will create the curved segment. If you choose curved-broken segment, after leaving the Input modifier you will have to define the third point of the curve between the starting and end point of the segment.

Defining polyline segments:
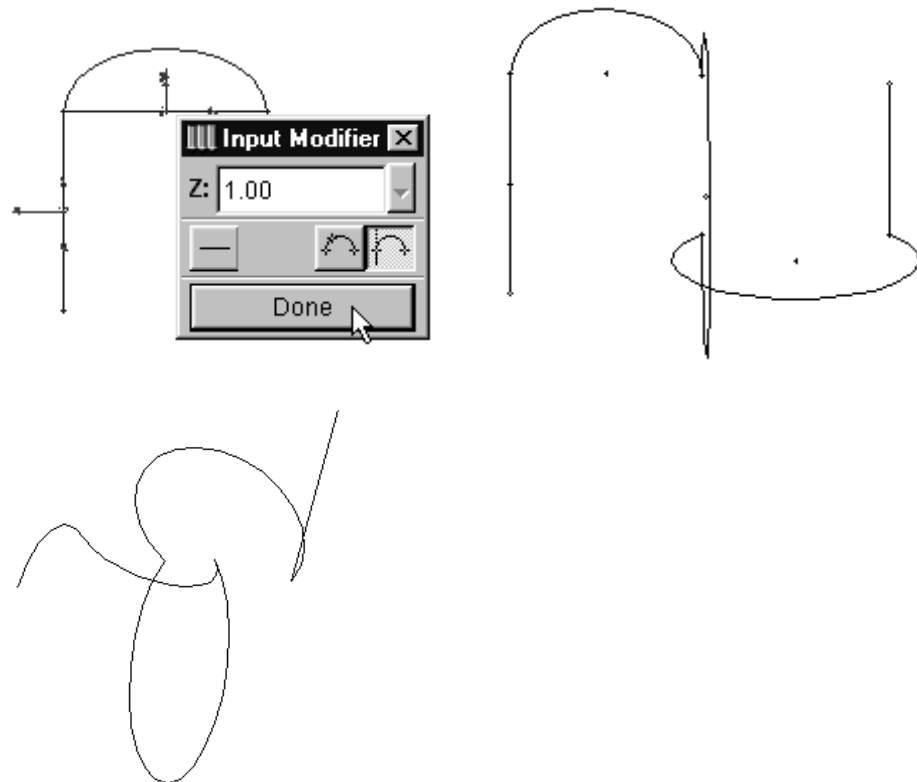
The Compass definition aid

GDL Toolbox now offers a very useful definition aid, to make spatial angle definitions easier. If the Compass angle definition checkbox is checked in the Preferences dialog box (by default) the angle definitions of the GDL Toolbox elements will be projected into the Floor plan. This projection makes it possible, to enter the angle values by using the standard ArchiCAD angle Coordinate. While the projected angle is visible on the Compass, the Element's feedback is also drawn at its original position.

Besides enabling the standard ArchiCAD angle input the Compass Tool makes it also possible to define the angle of the slanted, and flipped curved elements.
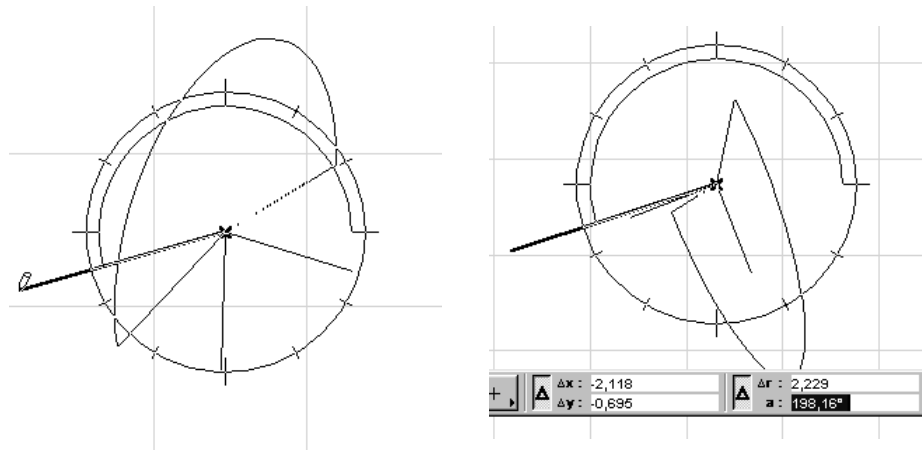
Managing Bool operations

ArchiCAD 8 supports a nice range of Bool Operations. Using the standard ArchiCAD tools the geometry of all elements may be modified using other elements. GDL Toolbox elements may also be modified using these functions, and can also work as operator elements.

The new Save Object command of GDL Toolbox 2.0 supports these new functions and features. The selected model will be saved as a GDL Object, with all the Bool information stored in the ArchiCAD Project.
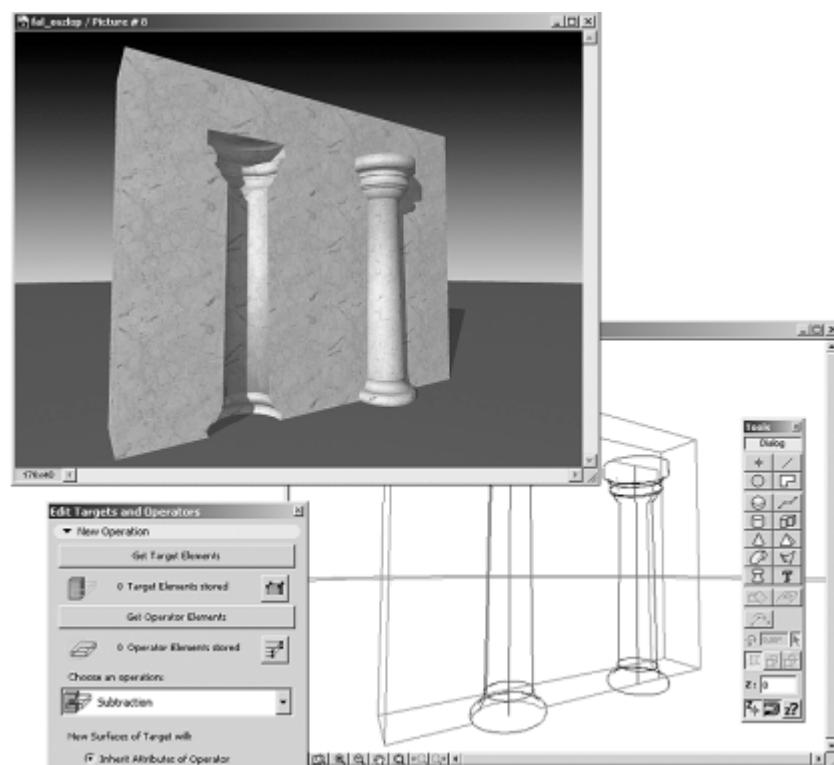
The saved object contains editable GDL scripts. If required, this script can be post processed using the standard ArchiCAD GDL editing possibilities.
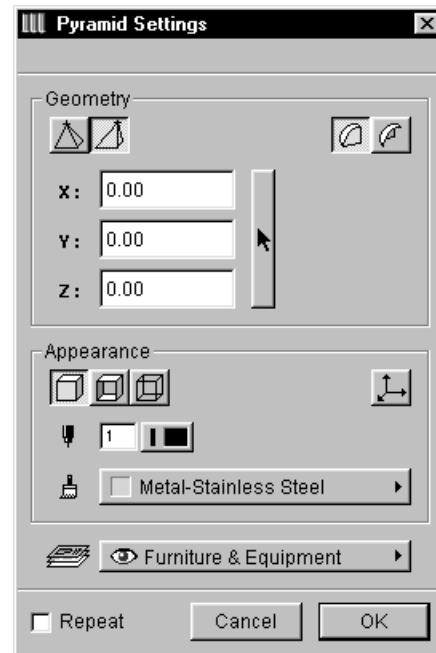
4. Chapter - Tools

Common settings

Defining elements

Using the tools of GDL Toolbox you can create geometrical elements in the following steps:

*1. Click the Tool button.* The element's settings dialog box appears.

2. Set up GDL Tool parameters These dialog boxes allow you to define the geometrical parameters and the information concerning the appearance of the element to be created.

If the Dialog button is turned off when clicking on the tool, the dialog box will not appear, and you can immediately start defining the element on the floor plan. In this case the last settings of the element will be used.

3. Define the element graphically. (In the same way as in ArchiCAD) you can specify the element's geometrical information by clicking on the floor plan, or in the 3D window. The graphical definition of each of the elements will be detailed later. Before each click ArchiCAD's Info box displays the name and purpose of the following operation.
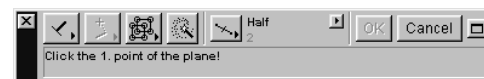

If you interrupt the operation while creating an element by clicking the Cancel button, the status before clicking GDL tool will return. The finished operation can be undone using the ArchiCAD Undo/Redo commands. The dialog boxes of the GDL Tool usually have five parts:

Definition field
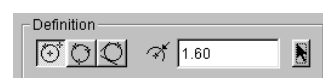
This field is not available at every element. However, this field allows you to select the method of the element's graphical definition. It works in the same way as the Construction method pop-up of the ArchiCAD elements. You will find the description of the Definition field at each element.

Geometry field
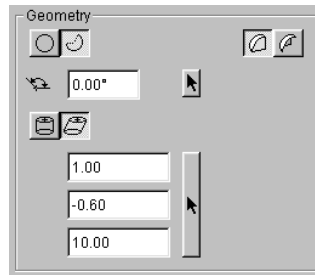
This field is available at most elements. Here you can define the parameters and information concerning the element's geometry. The settings defined here are closely relation with the floor plan interactions. It works similar to the Geometry method pop-up of ArchiCAD elements. Some of the settings can either be defined in the dialog box numerically, or on the floor plan graphically. Using the small arrow buttons by the parameters you can choose from these two definition methods. You will find the description of the Geometry field at each element.

Appearance field
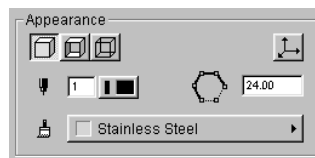
Using the *Element mode* button you can specify if the element should appear as body, surface or wireframe. In case of closed body the difference between the first two options can be observed only if the element is cut. (These settings concern the elements' behaviour in the model, they have nothing to do with the Block/Hidden/Hidden line... 3D appearance imaging options.)
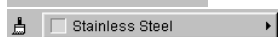

Using the *Coordinate system* button you can show or hide the local coordinate system of the element.
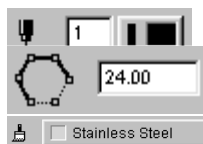
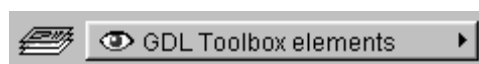The *Pen colour* of the element can be specified here.

The *Resolution* control appears at those elements, which contain curved segments. It works similar to the ArchiCAD Magic Wand Settings.
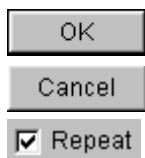
The *Material* of an element can be specified here.

Layer

In the same way as in ArchiCAD you can assign layers to your GDL Toolbox elements here.

Controlling the Dialog box

By clicking OK the element's graphical definition is started.

The Cancel button interrupts the element's definition.

By checking the *Repeat* checkbox, after the element's graphic definition a new definition will automatically be started according to the last settings without opening the dialog box.

Drawing of elements may be interrupted at any time by using the ArchiCAD *Cancel* button.

Modifying elements

You can modify existing GDL Toolbox elements with the following steps:

1. Select an element.

Dialog

2. *Click the corresponding tool* button. If the *Dialog* button is turned on, the element settings dialog box will appear. In this dialog box the parameters of the selected element may be modified.

Dialog

If the *Dialog* button is turned off, the element settings dialog box will not appear, it will automatically jump into the graphical modification mode. In this case the elements of that type will appear with dashed line and they can be modified one by one with the mouse.

3. *Modify the element graphically.* (In the same way as in ArchiCAD the elements' geometrical information may be modified by clicking and dragging their nodes.) Possibilities for modifying the elements graphically will be detailed later. After each click the ArchiCAD Info box display the name and purpose of the following operation.

4. *The element's graphical modification can be finished* by the Cancel button, or by clicking on a blank space. The finished operations may be undone by ArchiCAD Undo/Redo commands.

Nodes and gaps

On the key points of the element small circles are displayed. The cursor is sensitive to these points both in 2D and 3D and also on section. The z gravity recognizes the height of the points.

The circles indicating these points, basically appear in ArchiCAD and in printing too. The appearance of the circles can be controlled by the *Display nonprinting elements* checkbox in GDL Toolbox/Preferences dialog box.

Note: In the ArchiCAD 3D window the wireframe elements appear only if the *Contours:* parameter is in *Best* status in the *Image/3D window settings...* dialog box.

Shaded Mode:	Analytic
Contours:	Best

The name of some **GDL Tools** may be the same as the name of a similar **ArchiCAD** tools. In the GDL Tools description chapter a tool's name by itself always refers to a GDL Toolbox element. The reference to an ArchiCAD tool will be indicated separately.

Masking elements

Tubes, *Revolves*, and slanted *Prisms* offer enhanced masking possibilities. To set up special mask values, select the GDL Toolbox element, and open the Object Selection Settings dialog box of ArchiCAD. In the Custom Setting field you can modify the mask value.
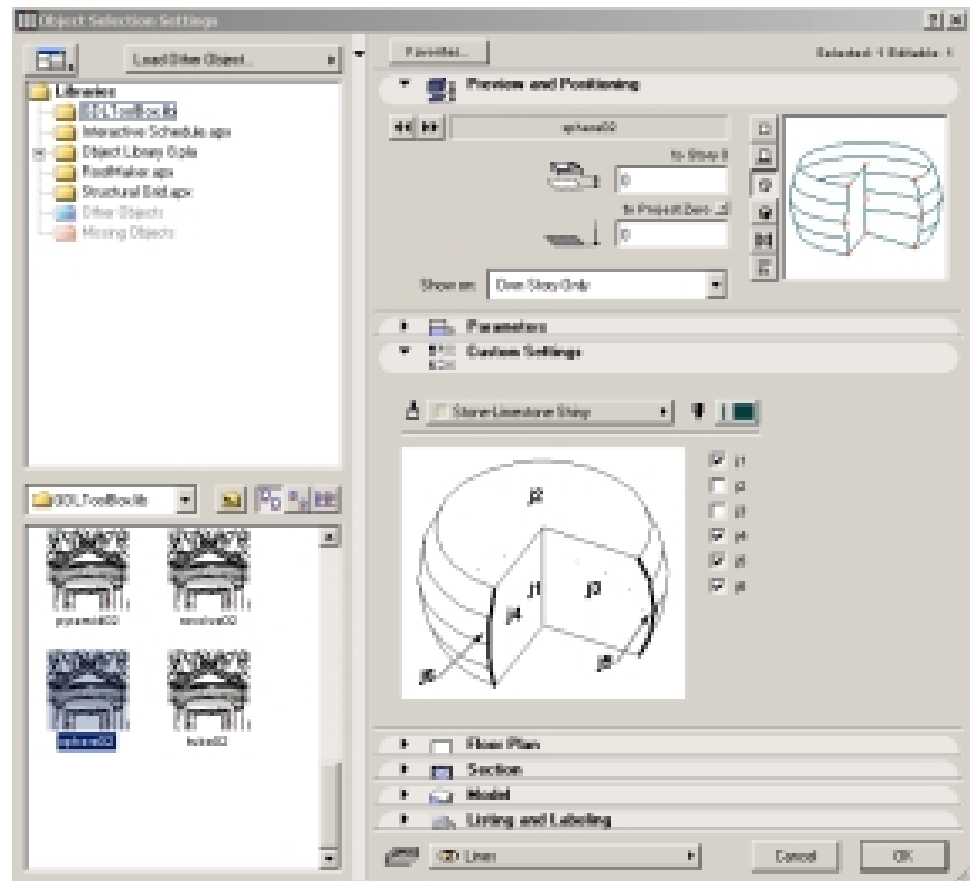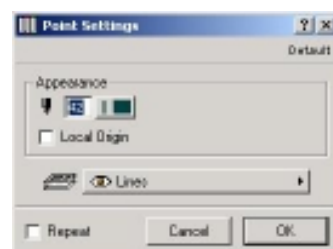

Tools' Descriptions

Point tool

Using the point tool of GDL Toolbox you can place a spatial point with one click. In the place of the point a cross will appear.

After clicking the point tool, if the *Dialog* button was turned on, the following dialog box appears:

Definition of local origin

If the local origin checkbox is turned on, the placed point will have a special meaning.

If you save a selection as GDL or as an object - using the saving commands in the GDL Toolbox menu -, you can define the local origin of the saved set of elements by a single point of that kind.

Note: One selection for saving may contain only one point with turned on Local origin checkbox.
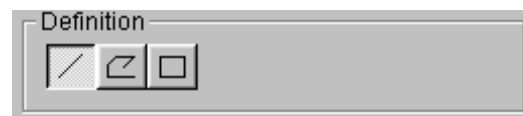
Line tool

Using the line tool of GDL Toolbox you can place a spatial line by clicking twice.

After clicking the line tool, if the *Dialog* button was turned on, the following dialog box appears:
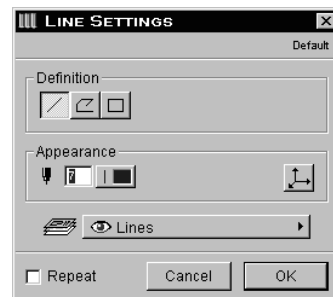
In the Definition part of the dialog box you can select from three geometrical methods:


- In the *Simple line* mode you can draw independent lines by two clicks.

- In the *Line Chain* mode you can draw line chains by clicking successively. The operation can be finished by double-clicking on the last point or by clicking the Cancel button.

- In the *Rectangle line* mode you can draw four lines by specifying a rectangle's two neighbour corners with two clicks and with a third point at the rectangle's opposite side.

Editing lines interactively

If the dialog box is turned off, the selected line can be modified interactively. Click the line tool and the colour and line type of the selected element will change indicating the element is in editing mode. The cursor will take the scissors shape. Click on a node (small square) of the selected element and modify it with the help of the mouse and the Input modifier the same way as in ArchiCAD.

The following illustration shows all the options of interactive modification of a line:
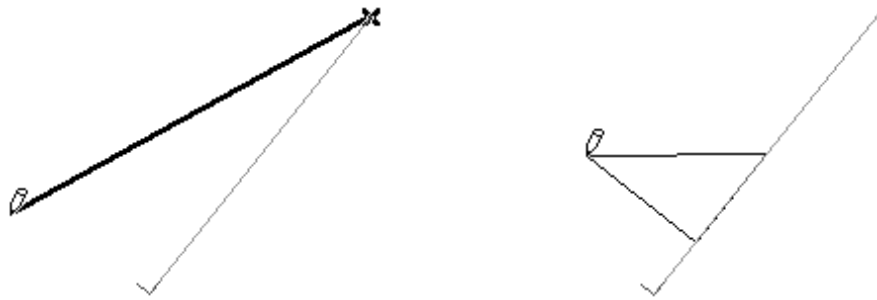
1. By clicking on an endpoint you can reposition the endpoints of a line in the space.

2. By clicking on the center point you can change the length of a line, keeping the line's original direction.

Creating lines from other elements

By clicking the line tool while definitional elements are selected, the new element will be created on the basis of the geometrical information of the selected elements. (This operation is similar to ArchiCAD's SPACE click.) The following list contains the possible definitional elements converting elements to lines:

1. Two points (a line will be drawn between the two points)

2. Polygon (lines will be drawn onto edges of the polygon)

3. Circle/Arc (Using the segmentation value defined in the GDL-Toolbox/Preferences dialog box the circle or arc will be converted to lines)

4. Polyline (Using the segmentation value defined in the GDL-Toolbox/ Preferences dialog box the polyline will be converted to lines)

5. Two ArchiCAD points

6. ArchiCAD line

7. ArchiCAD Circle/Arc (Using the segmentation value defined in the GDL-Toolbox/Preferences dialog box the circle or arc will be converted to lines)

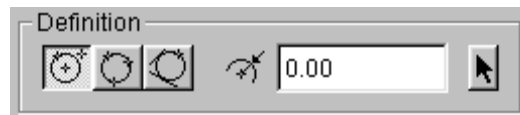8. ArchiCAD Fill (lines will be drawn onto the edges of the fill)

Circle/Arc tool

You can place spatial circles and arcs using the Circle/Arc tool of GDL Toolbox.

After clicking the **Circle/Arc** tool, if the *Dialog* button was turned on, the following dialog box appears:
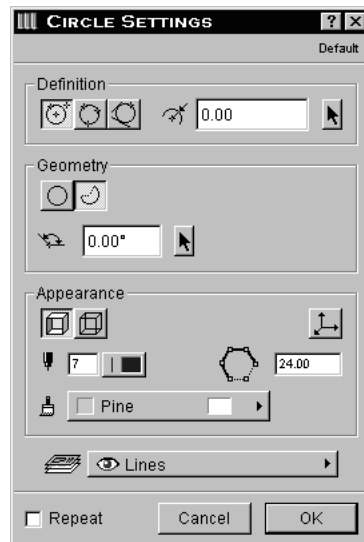
In the definition part of the dialog box you can choose from three geometrical methods:

- If you choose the *Center point* definition mode, by the first click you can specify the circle's center point. By a second click you can define the radius of the circle (if it has not been defined in the dialog box numerically). By the third click the plane of the circle will be defined. If you have defined the radius of the circle in the dialog, the second and third clicks will define the plane only.

- In *three-point* mode you can specify three spatial points of the circle or arc with three successive clicks.

- In *tangent* mode with three clicks you can define two lines, which will be two tangents of the circle. After the third click the program will draw a circle with the radius value set in the dialog box.

In the Geometry part of the dialog box you can choose between circle and arc definition:
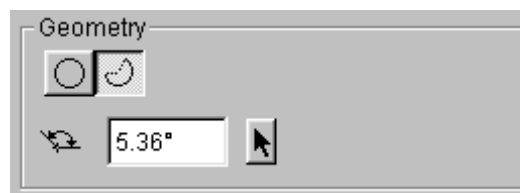
In case of drawing an arc you can choose between numerical and graphical modes using the cursor button.

In numerical definition the angle will be measured from the local x-axis of the circle.

In graphical definition the program places a whole circle at first and you will be needed to define the angle of the arc by specifying two vectors. The arc will be placed between the two vectors in positive (anticlockwise) direction.
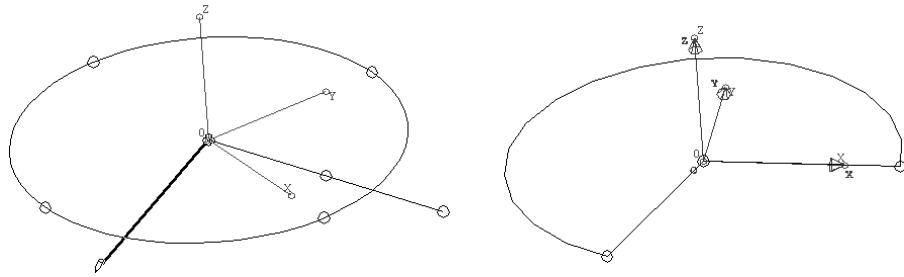
Editing Circle/Arc interactively

Selected circles and arcs can be modified interactively if the dialog box is disabled. The following illustration shows the options for interactive modification of a circle/arc:
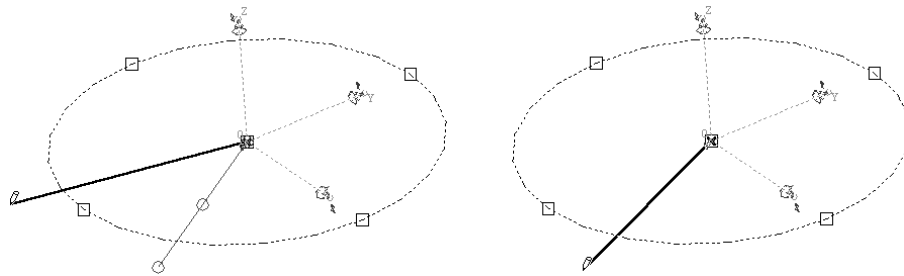
1. By clicking on a *perimeter point* the angle of the circle or arc can be changed. You can open circles or close arcs with this method.

2. By clicking on the center point the radius can be modified.

Creating Circles/Arcs from other elements

The following list contains the possible definitional elements for converting elements to Circle/Arc:

1. Three Points (circle will be drawn on three points)

2. Polyline (Curved segments will be converted onto arcs and straight segments onto lines)

3. Three ArchiCAD Points (circle will be drawn on three points)

4. ArchiCAD Circle/Arc

Polygon tool

You can define spatial flat planes using the polygon tool of GDL Toolbox.

After clicking the Polygon tool, if the *Dialog* button was turned on, the following dialog box appears:
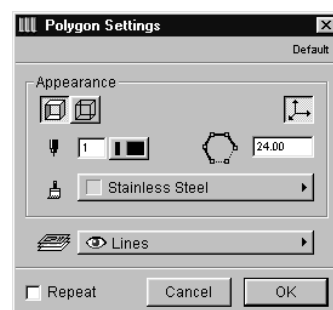
While the graphical definition the corner points of a polygon will be given by clicks. The clicks specify spatial points, but after defining the first three independent points, the program will generate the polygon in the plane defined by them. The program automatically projects the further points of the polygon into that plane.

You can also draw curved segments when drawing a polygon with the help of the Input modifier. (You find detailed description in Chapter 3 under defining curved segments.)

The Polygon tool handles curved segment only during the creation. As the element is placed the program automatically segments these curved segments and handles them as straight segments.

While the definition of the polygon, the already defined corner points may be erased - without interrupting the definition - using the *Backspace* button.

Editing polygons interactively

The selected polygons can be modified interactively if the dialog box is disabled. The following illustration shows the options for interactive modification of polygons:

- By clicking on a *corner point* the point can be replaced. If the new point is not in the plane of the polygon, the program will automatically project into it

- By clicking on a *segment's center point* you can insert a new corner point or convert the given segment into curved segment with the help of the Input modifier. Corner points may be deleted by dragging over each other.

Creating polygons from other elements

The following list contains the possible definitional elements for converting elements to polygons:

1. Three Point (polygon will be drawn on three points)

2. Continuous Line-Arc chain (The opened chain will be closed)

3. Circle/Arc

4. Continuous ArchiCAD Line/Arc chain

5. ArchiCAD Circle/Arc

6. ArchiCAD Fill (The curved segments will be segmented)

7. ArchiCAD Slab (The upper plane of the Slab will be converted, the curved segments will be segmented)

8. ArchiCAD Roof (The upper plane of the Roof will be converted, the curved segments will be segmented)

Drawing holes into polygons

You can create polygons with holes in it, by converting ArchiCAD Fill, Slab, or Roof elements with holes.

Polyline tool

Using the Polyline tool of GDL Toolbox you can place open or closed chains containing spatial straight and curved segments.

After clicking the Polyline tool, if the *Dialog* button was turned on, the following dialog box appears:
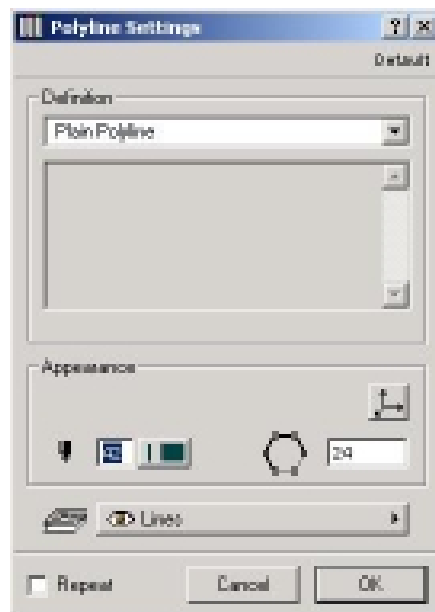
In the definition method pop-up you can choose from parametric pre-defined polylines, and you can also choose the standard segment based definition method.

Plain Polyline

If choosing the plain polyline method, while the graphical definition you can specify the segments of with successive clicks. With the help of the Input modifier you can define straight and curved segments. If you click on the last clicked point once again, the program will finish the polyline. If you click on the starting point, a closed polyline will be created. While the definition of the polyline, the already defined corner points may be erased - without interrupting the definition - using the *Backspace* button.

Parametric pre defined shapes

If choosing from the pre defined shapes, the parameters of the polyline will appear in the parameter list. Using these parameters you can set up the shape.
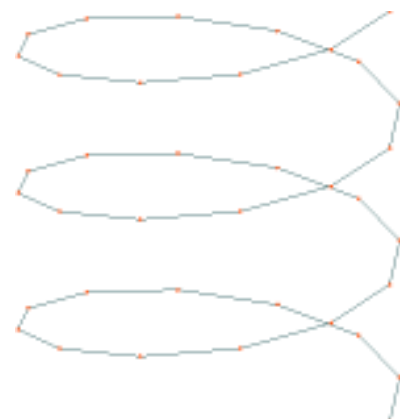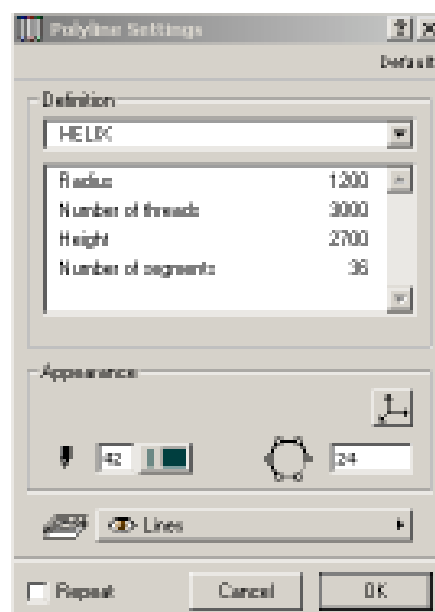
After pressing OK, the polyline will be placed by one single click.

Note: The placed polyline will consist of standard polyline segments. This polyline will behave as if placed as a plain polyline. No more parametric modifications are possible.

Editing polylines interactively

Selected polylines can be modified interactively if the dialog box is disabled. The following illustration shows the options for the interactive modification of a polyline:
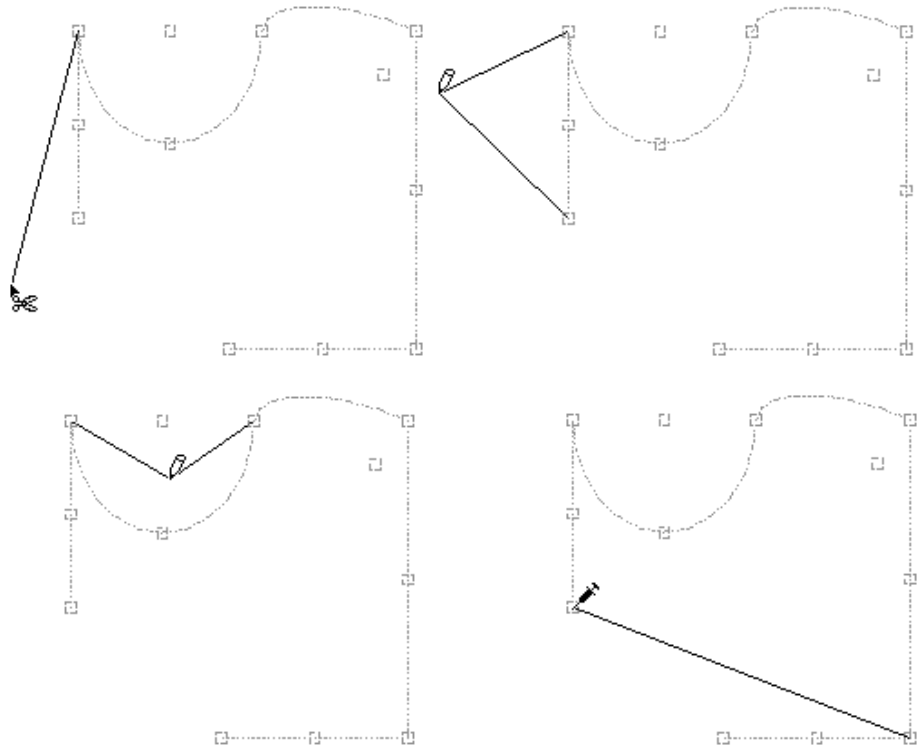
- By clicking on a *corner point,* the point can be repositioned.

- By clicking on the *center point of a straight segment,* you can insert a new corner point, or the given segment can be modified to be a curved segment, with the help of the Input modifier. The corner points can be deleted by dragging onto each other.

- By clicking on the *center point of a curved segment,* it can be converted to a straight segment with the Input modifier, or the curved segment can be redefined.

- By dragging an end point onto a starting point the polyline can be closed.

Creating polylines from other elements

You may create polylines automatically by converting them from other elements. The following list contains the possible definitional elements for converting elements to polylines:

1. Continuous Line-Curve chain

2. Circle/Arc

3. Polygon

4. Continuous ArchiCAD Line-Curve chain

5. ArchiCAD Circle/Arc

6. ArchiCAD Fill (The curved segments will be inherited)

7. ArchiCAD Slab (The upper plane of the Slab will be converted, the curved segments will be inherited)

8. ArchiCAD Roof (The upper plane of the Roof will be converted, the curved segments will be inherited)

Sphere tool

Using the Sphere tool of GDL Toolbox you can place spheres, spherical sections, segments end their combinations.
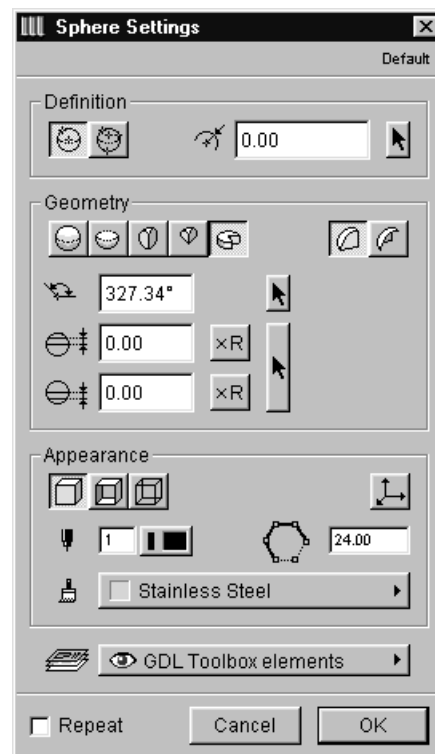
In the Definition part of the dialog box you can choose from two geometrical methods:
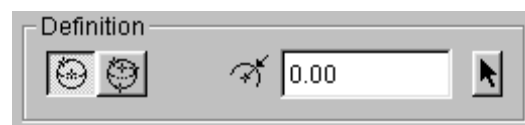
- In *center point definition* mode the center point of the sphere should be defined by the first click.

- In *four points* definition mode you can define it by four successive clicks. In this geometrical mode the radius cannot be defined numerically.

In the Geometry part of the dialog box, you can choose from different predefined sphere definitions, as well as text fields entering the corresponding parameters:
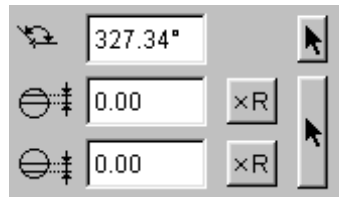
- Whole sphere

- Semi sphere

- Quarter sphere

- Eighth sphere

- Custom Sphere

GDL Toolbox provides the following options for degenerating the sphere's geometry:

- Changing of the equator's central angle,

- Cutting with two planes parallel to equator

These modifications can be specified by the parameters choosing the Custom Sphere option.

In the first four modes the parameters are filled with special values and are dimmed. In the last mode you can define these parameters numerically and graphically, too.

The position of cutting planes parallel to the equator can be defined in the rate of the radius. If you click the radius-dependent button, you can give values between 0 and 1 for defining the place of cutting plane.

If you desire to define the parameters graphically, click the cursor button next to the appropriate parameter.

In the course of definition, first the program places the whole sphere, then waits for the definition of the central angle (see Circle tool) and the definition of the two intersecting planes by two clicks.

Spheres will always be generated in basic position so that the equator of it is parallel to the Global x-y plane. If required it can be repositioned using transformations.

Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.

Editing spheres interactively

Selected spheres can be modified interactively if the dialog box is disabled. Click the Sphere tool and the colour and line type of the selected element will change indicating the element is in editing mode. The cursor will take the scissors shape. Click on the node (small square) of the selected element and modify it with the help of the mouse and the Input modifier in the same way as in ArchiCAD.

The following illustration shows the options of interactive modification of a sphere:
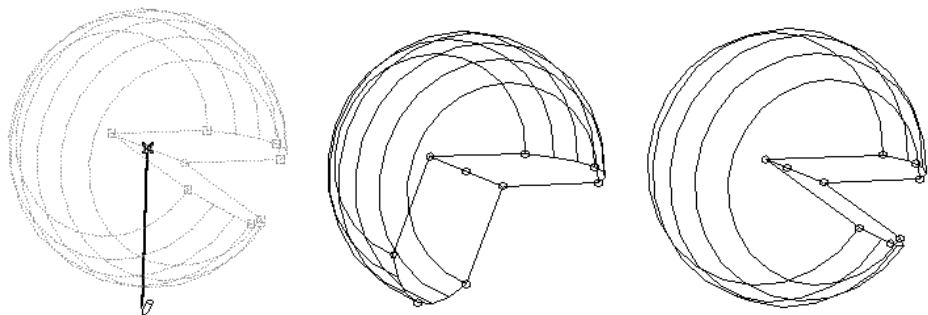
1. By clicking on the *center point,* the radius of the sphere can be modified

2. By clicking on an *equator point* or on a *curve point,* the central angle of the sphere can be modified. With this mode spheres can be opened or closed.

3. By clicking on the *center point of a cut circle segment,* the placement of the plane of cutting can be modified

Creating spheres from other elements

The following list contains the possible definitional elements for converting elements to spheres:

1. Two points (sphere will be drawn by center point and superficies point)

2. Three points (sphere will be drawn from three equator points)

3. Four points (sphere of four points will be drawn)

4. Circle/Arc (sphere will be drawn onto the given element as equator)

5. Three ArchiCAD point (sphere will be drawn from three equator points)

6. ArchiCAD Circle/Arc (sphere will be drawn onto the given element as onto equator)

Cylinder tool

You can place spatial straight and slanting cylinder and cylinder segments using the Cylinder tool of GDL Toolbox.
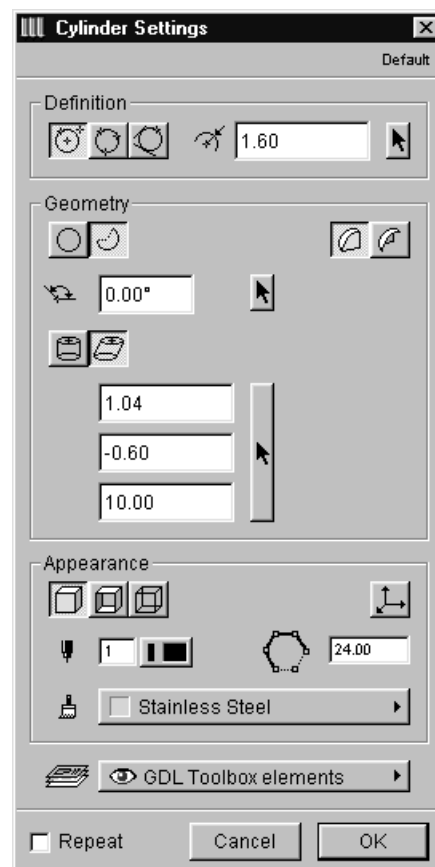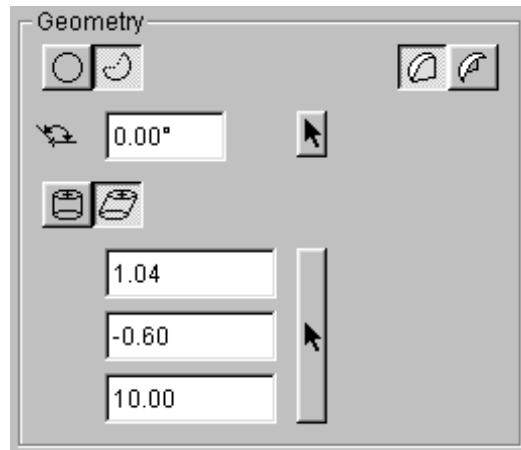

In the Definition part of the dialog box, you can choose from three geometrical methods:
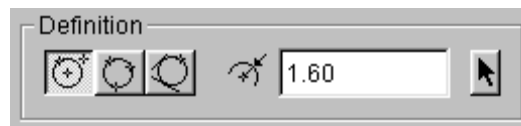
The geometrical methods of the cylinder are similar to the circles. You can find the detailed description there.

In the Geometry part of the dialog, you can choose between circle and arc bases. Here you can define the cylinder's other geometrical parameters:

The cylinder's geometrical appearance can be controlled with the following parameters:
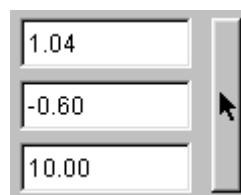

You can choose between straight and slanting cylinders. The center point of the cylinder's upper circle can be defined graphically or numerically using the parameters. During graphical cylinder definition first the program draws the whole circle, then the central angle can be defined by two vectors and finally a third vector is required for the height.

Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.

Editing cylinders interactively

Selected cylinders can be modified interactively, if the dialog box is disabled. The following illustration shows the options for interactive modification of a cylinder:
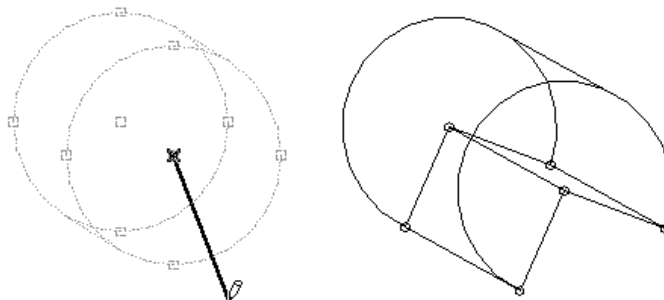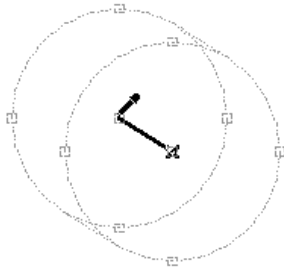
- By clicking on a *perimeter point,* the angle of a circle or arc can be changed. The cylinder can be opened or closed using this method.

- By clicking on the *center point of the base circle*, the radius can be modified.

- By clicking on the *center point of the upper circle*, the vector of height can be edited.

Creating cylinders from other elements

The following list contains the possible definitional elements for converting elements to cylinders:

1. Three Points (base circle will be drawn on three points)

2. Circle/arc

3. Three ArchiCAD Points (circle will be drawn on three points)

4. ArchiCAD Circle/Arc

Cone tool

You can place spatial straight and slanting cones and conical segments using the Cone tool of GDL Toolbox.
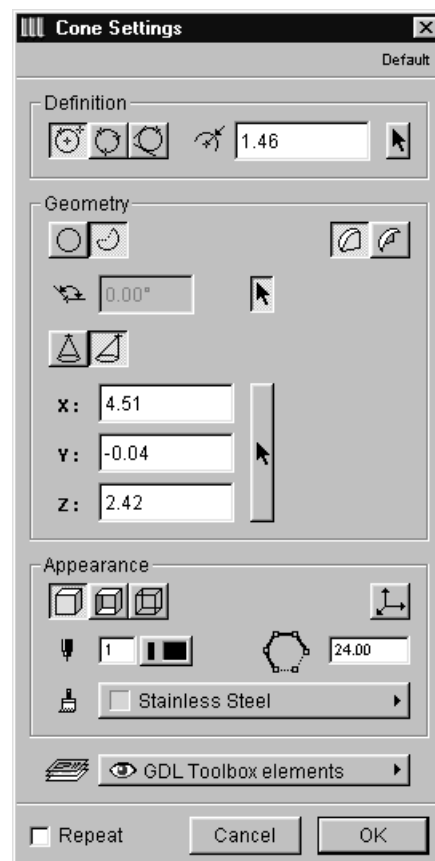
In the Definition part of the dialog, you can choose from three geometrical modes:
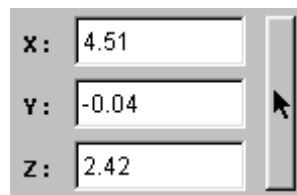
The geometrical methods of the cone are similar to the circles. You can find the detailed description there.

In the Geometry part of the dialog, you can choose between circle and arc bases. Here you can define the cone's other geometrical parameters:

The cone's geometrical appearance can be controlled with the following parameters:

You can choose between straight and slanting cones. The point of the cone's peak can be defined graphically or numerically using the parameters. During graphical definition first the program draws the whole circle, then the central angle can be defined by two vectors and finally a third vector is required for the height.

Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.

Editing cones interactively

Selected cones can be modified interactively, if the dialog box is disabled. The following illustration shows the options for interactive modification of a cone:
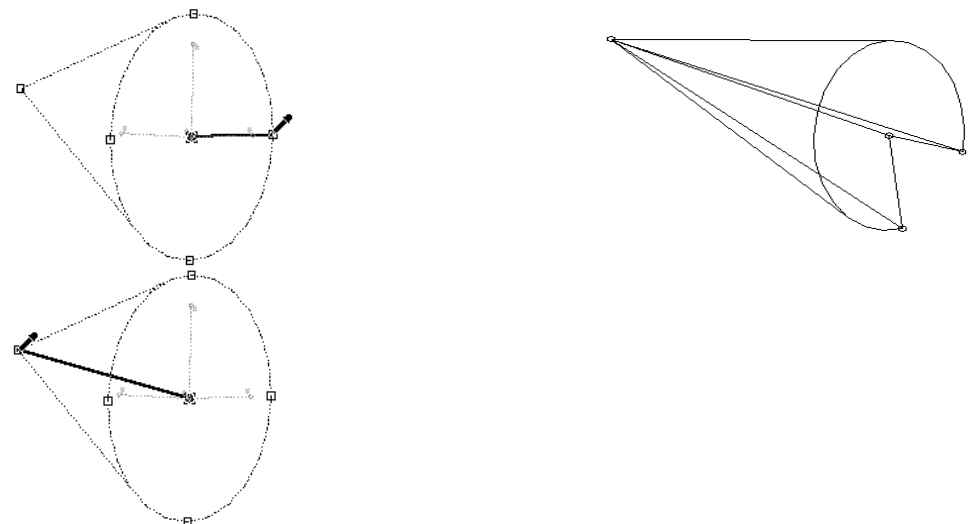
- By clicking on a *perimeter point,* the angle of a circle or arc can be changed. The cylinder can be opened or closed using this method.

- By clicking on the *center point of the base circle*, the radius can be modified.

- By clicking on the *peak point*, the vector of height can be edited.

**Creating cones from other elements**

You may create cones automatically by converting them from other elements definitional elements for converting elements to cones:

1. Three Points (base circle will be drawn on three points)
2. Circle/arc
3. Three ArchiCAD Points (circle will be drawn on three points)
4. ArchiCAD Circle/Arc

Prism tool

You can place spatial straight and slanting prisms using the Prism tool of GDL Toolbox.

The definition methods of the prisms are similar to the polygon's. You can find the detailed description there. The following buttons can control the prism's geometrical appearance:
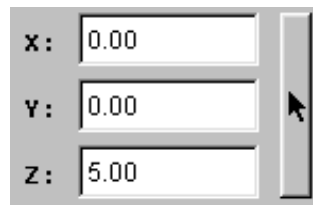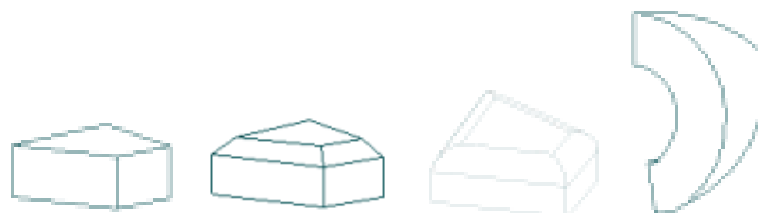

You can choose between straight and slanting prism.
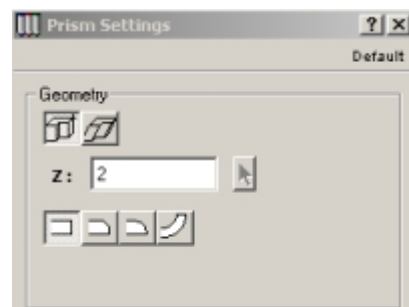
If choosing straight prism, the following geometries are available:

Choose the required geometry, and set up the parameters.
The different geometries provide the following results:

Derived from the corresponding straight prism by bending the x-y plane onto a cylinder tangential to that plane. Edges along the x axes are transformed to circular arcs; edges along the y axes remain horizontal; edges along the z axes will be radial in direction.

If choosing slanted prism, the first point of the prism's upper polygon (vector of height) can be defined graphically or numerically with parameters. During graphical definition first the program draws the basic polygon, then a vector can define the height.

Editing prisms interactively

Selected prisms can be modified interactively if the dialog box is disabled. The following illustration shows the options for interactive modification of an prism:
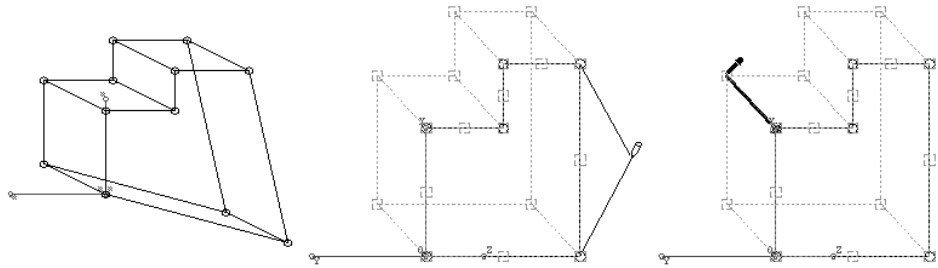
- By clicking on a *corner point of the basic polygon,* the point can be repositioned. If the new point is not in the plane of the polygon, the program will automatically project into it.

- By clicking on the *center point of a segment of the basic polygon*, a new corner point can be inserted, or the given segment can be converted into curved segment with the help of the Input modifier. Corner points can be deleted by dragging them onto each other.

- By clicking on an *upper corner point*, the vector of height can be edited.

Creating prisms from other elements

The following list contains the possible definitional elements for converting elements to prisms:

1   Polygon

2   Continuous Line-Arc chain (The opened chain will be closed)

3   Circle/Arc

4   Continuous ArchiCAD Line/Arc chain

5   ArchiCAD Circle/Arc

6   ArchiCAD Fill (The curved segments will be segmented)

7   ArchiCAD Slab (The upper plane of the Slab will be converted, the curved segments will be segmented)

8   ArchiCAD Roof (The upper plane of the Roof will be converted, the curved segments will be segmented)
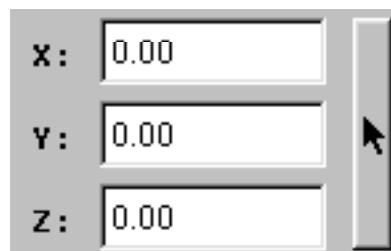
Pyramid tool

Using the Pyramid tool of GDL Toolbox you can place spatial straight and slanting pyramids.
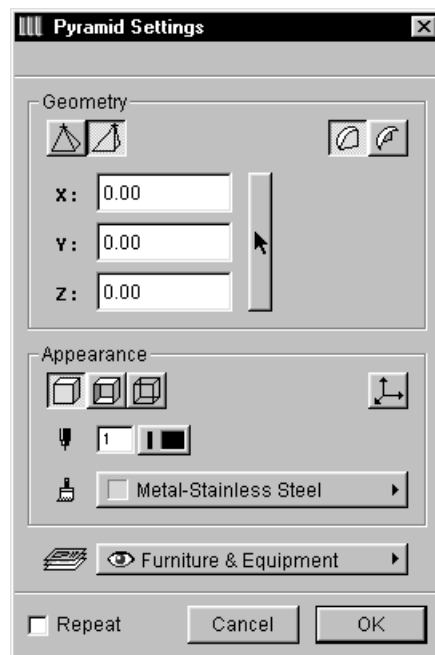
The geometrical methods of the pyramids are similar to the polygons. You can find the detailed description there.

The pyramid's geometrical appearance can be controlled with the following parameters:


You can choose between straight and slanting pyramid. The position of the pyramid's peak (vector of height) can be defined graphically or numerically with the parameters. During graphical definition first the program draws the basic polygon, then a vector can define the height.


Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.

While the definition of the pyramid, the already defined corner points may be erased - without interrupting the definition - using the *Backspace* button,.

Editing Pyramids interactively

Selected Pyramids can be modified interactively if the dialog box is disabled. The following illustration shows the options for interactive modification of a pyramid:
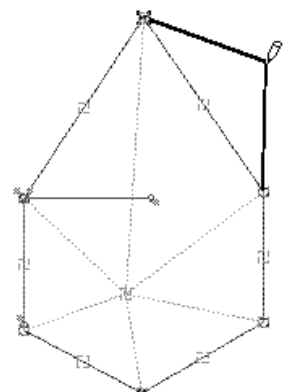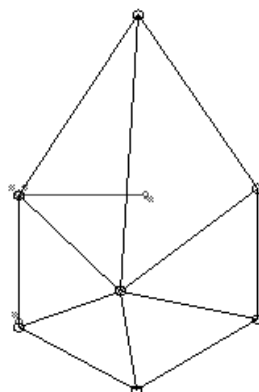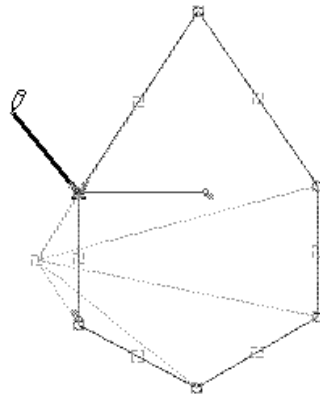
- By clicking on a *corner point of the basic polygon,* the point can be repositioned. If the new point is not in the plane of the polygon, the program will automatically project into it.

- By clicking on the *center point of a segment of the basic polygon*, a new corner point can be inserted, or the given segment can be converted into curved segment with the help of the Input modifier. Corner points can be deleted by dragging them onto each other.

- By clicking on the *peak point*, the vector of height can be edited.

Creating Pyramids from other elements

The following list contains the possible definitional elements for converting elements to pyramids:

- Polygon

- Continuous Line-Arc chain (The opened chain will be closed)

- Circle/Arc

- Continuous ArchiCAD Line/Arc chain

- ArchiCAD Circle/Arc

- ArchiCAD Fill (The curved segments will be segmented)

- ArchiCAD Slab (The upper plane of the Slab will be converted, the curved segments will be segmented)

- ArchiCAD Roof (The upper plane of the Roof will be converted, the curved segments will be segmented)

Tube tool

Using the Tube tool of GDL Toolbox you can create a complex tubular body or surface by shifting a predefined or a custom plane along a polyline.
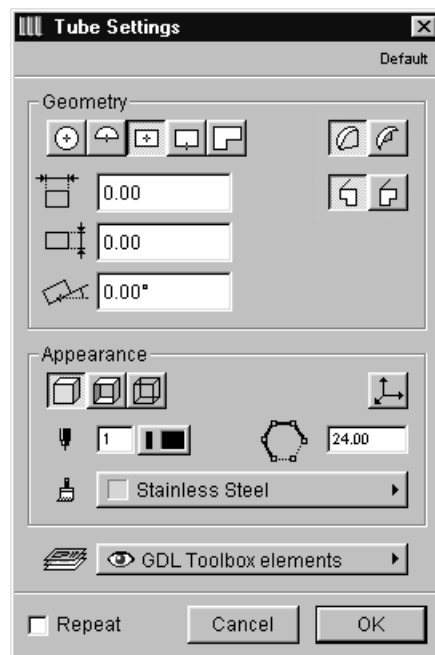
In the Geometry part of the dialog box you can choose from different predefined profiles and a custom form:

The first four buttons allow you to shift predefined forms along the polyline. The parameters serve for defining these profiles.

By choosing the fifth button, you can define the profile graphically.

When drawing a tubular element, the polyline has to be drawn first. About drawing a polyline you can read at the Polyline tool in detail. The next step is drawing the profile with the help of a polygon. (If you chose a predefined form, these steps are omitted and the program places the tubular element.) About drawing a polygon you can read at the Polygon tool in detail. After drawing the polygon, with a click you have to define the point with which the polygon will be shifted along the polyline.

You can both flip and rotate the custom shaped profile of a selected Tube in its dialog box. This feature makes the definition and the modification of tubular elements easier.

Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.
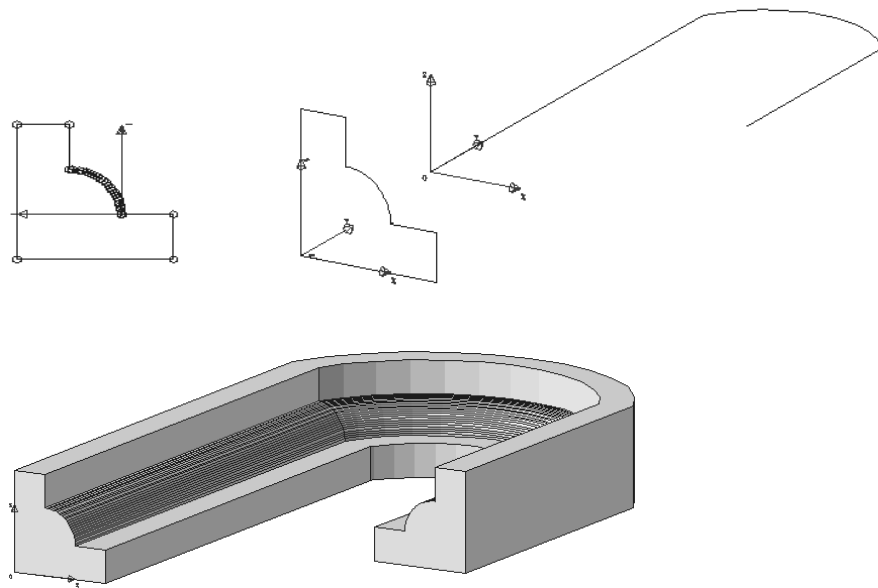
Editing tubular elements interactively

Selected tubular elements can be modified interactively if the radio button is disabled. Click the Tube button and the element will convert to its definitional elements (polygon and polyline). These elements can be modified in the way written earlier. You will need to create a tube again by selecting these modified elements and clicking the Tube tool. The program will recreate the tubular element with the modified geometry.

During the modification the shifting point of the polygon has to be redefined.

Creating tubular elements from other elements

The following list contains the possible definitional elements for converting elements to tubes:

1. Polyline (element will be generated by defining a profile graphically or using a predefined one)

2. Polygon (element will be generated by defining a polyline)

3. Polyline and Polygon (element will be generated by defining a shifting point)

Revolve tool

Using the Revolve tool of GDL Toolbox, you can create complex revolved elements by rotating a predefined or freely drawn plane around an axis lying in the form's plane.
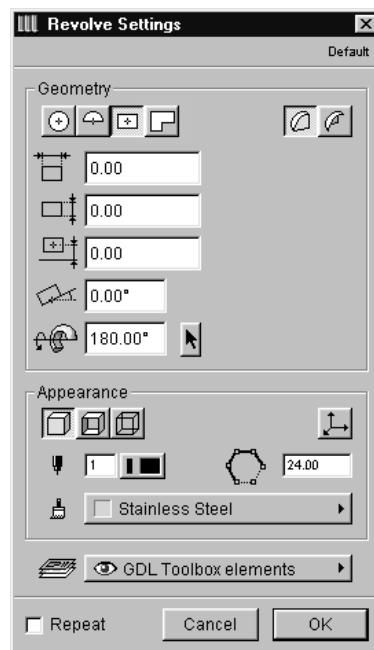
In the Geometry part of the dialog box you can choose from different predefined profiles and a custom form:


The first three buttons allow you to rotate predefined forms. The parameters enable these profiles and the axis of rotation to be defined.

By choosing the fourth button the profile can be defined graphically.

When drawing a revolved element, first the profile has to be defined by drawing a polygon. If you chose a predefined form, these steps are omitted. About drawing a polygon you can read at the Polygon tool in detail. After drawing the polygon, the axis of rotation has to be defined with two clicks. If you chose a predefined form, after having defined the axes, a third click is required for defining the starting plane.

Using the Body/Cloak buttons, you can define, if the whole body, or just the cloak of it should be represented.
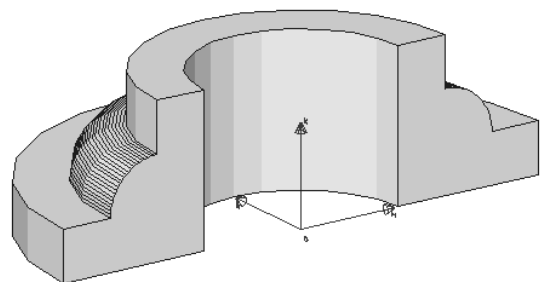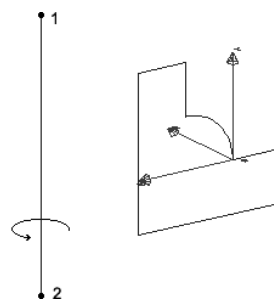
Editing revolves interactively

Selected revolves can be modified interactively if the dialog box is disabled. Click the Revolve button and the element will be converted to its definitional elements (polygon and line). These elements can be modified in the way written earlier. By clicking the Revolve tool again with the modified elements selected, the program will recreate the revolved element with the modified geometry.

Creating revolves from other elements

You may create revolved elements automatically by converting them from other elements. The following list contains the possible definitional elements for converting elements to revolved elements:

1. Polygon (element will be generated by defining the axis)

2. Line and Polygon

3D surface tool

Using the 3D surface tool of GDL Toolbox you can create a complex spatial surface by drawing polylines. The program will span a surface between the polylines.


While drawing a 3D surface, polylines have to be defined. About drawing a polyline you can read at the Polyline tool in detail. A polyline may contain both curved and straight segments. The polylines have to contain segments of the same number.

The 3D surface tool only handles the curved segments at their creation. While the definition, the program automatically segments these curves and they will be handled as straight segments later.
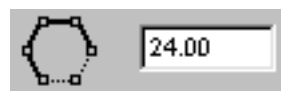
In the Geometry field you can set the gravity value using the slider control. If the slider is on the very left, no gravy effects on the surface.
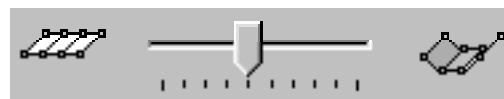

In the appearance window a number field appears:
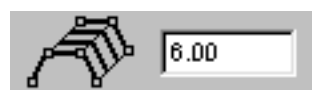
In this field the surface's transversal resolution can be defined. This value defines the number of segments between the two polylines.

The surface will be spanned between the polylines. The number of polylines is not restricted. This new feature provides a flexible way of

drawing complicated geometries. In the dialog box you have to define the number of polylines. After pressing OK, the polylines will be input after each other.
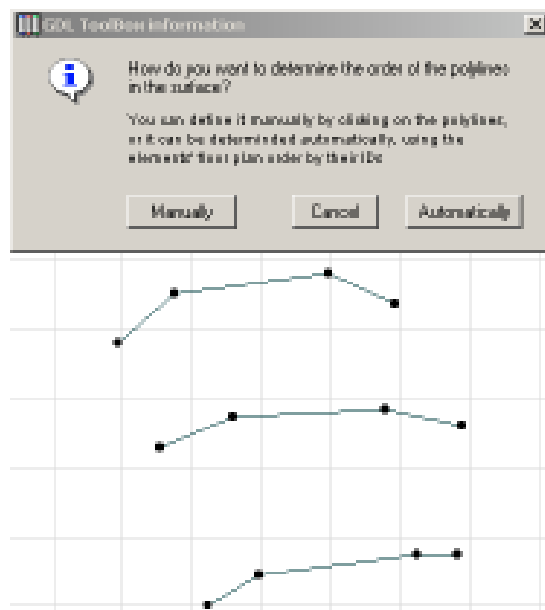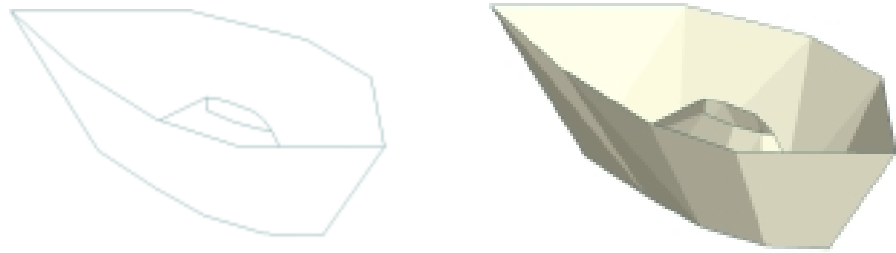
Editing 3D surfaces interactively

Selected 3D surfaces can be modified interactively if the dialog box is disabled. Click the 3D surface tool and the element will become in editmode. You can click on the gap points of the surface, and drag them to the new position or decompose the surfaces to polylines. This feature opens new dimensions in modeling irregular forms.
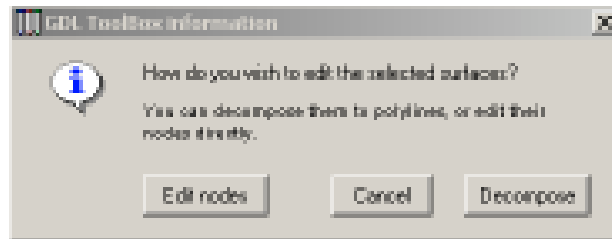
Creating 3D surfaces from other elements

The following list contains the possible definitional elements for converting elements to 3D surfaces:

1. One Polyline (element will be generated by defining the other polyline)

2. A set of Polylines

3D text tool

Using the 3D text tool of GDL Toolbox you can create spatial texts fitted onto a plane, cylinder or sphere. Texts can be selected by the nodes at the bottom of each letter both on the floor plan and in the 3D window, but the z magnet is not sensitive to these points.
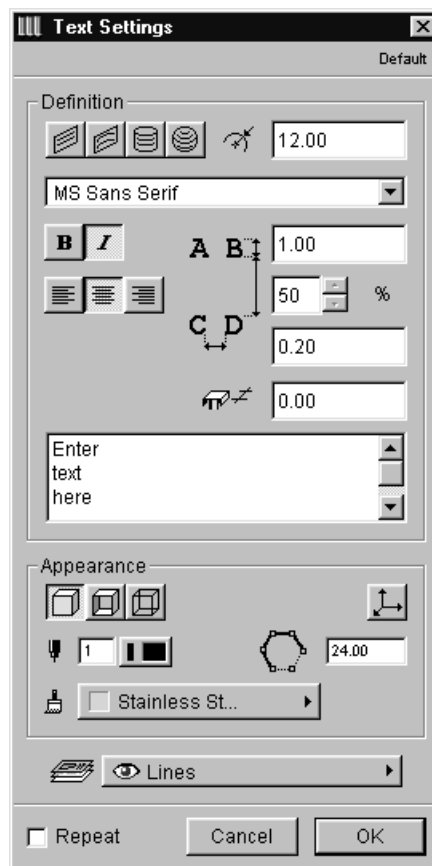
 On the top of the Definition part you can choose from four geometrical modes. The figure below illustrates the four different fitting options:

In the radius field the radius of the curved geometries can be defined.

You can choose font type with the controls under the buttons and the parameters concerning the text's appearance can be set here, too.
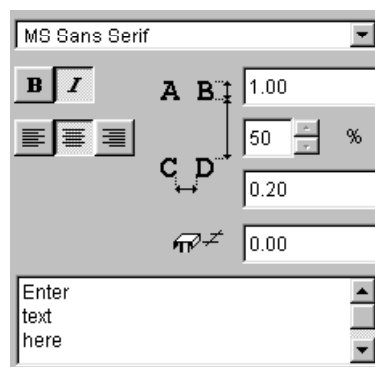
If you use too many 3D texts on the floor plan, it will slow down the program. GDL Toolbox offers, to represent all letters by blocks speeding up the project again. You can switch to block display in the GDL-Toolbox/Preferences dialog box. Before printing or rendering, the text's appearance can be changed back into the original form.
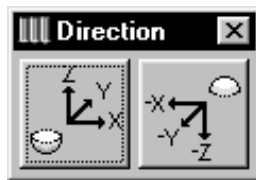
Cutting tools

Cutting Planes

With the Cutplane tool you can cut the selected GDL Toolbox elements into slices with infinite planes, or just remove the cutting planes and restore the elements. You can define cutting planes by one click (horizontal plane), two clicks (vertical plane) or by three 3D points. Elements may be cut with several planes successively.
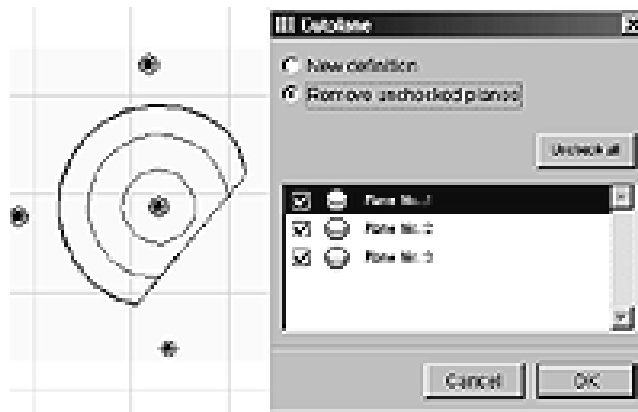

You can define the direction of the removable elements using the direction palette:

Unlike ArchiCAD's trimming to roof command, the GDL Tool box cuttings appear both in 2D and 3D.

If you want to modify a cut element, select the element you want to modify the cutpplane definitions within and click the Cutplane tool. The Cutplane dialog box appears.


By the radio buttons at the top of the dialog you can choose from defining *new* Cutplanes, or *remove* existing ones.

In the List of the dialog box all cutting definitions are visible. You can *remove the cutplanes* one by one. By unchecking the rows, the *cutplane definitions can be removed* from the element.

Cutting Polygons

The Cuthole tool offers three predefined forms, and a custom form to intersect infinite prisms with GDL Toolbox elements. The common part of the intersected elements will be removed. Using this tool you can make up to twelve holes into all GDL Toolbox surface and body typed elements.
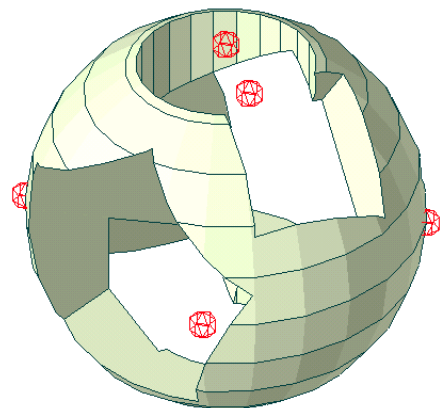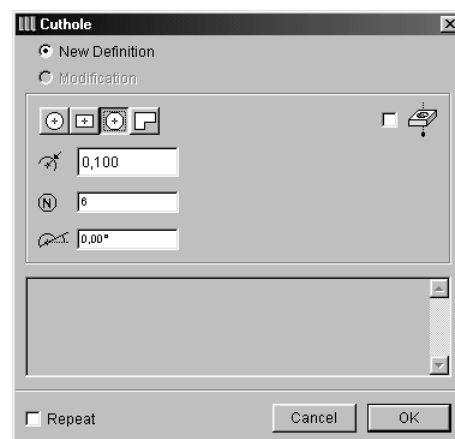
You can **define** Cutting holes as followings:

- Select the element(s) you want to drill.

- Click the Cuthole tool; the Cuthole dialog appears.

- Select from the predefined shapes, or click custom shape if required.

- If predefined shape is selected, use the parameters to define the shape

- If you check the Vertical Definition, checkbox, you will need to define only one click to position the vertical Cuthole.

- Click OK

- If the Vertical Definition checkbox is not checked, the cutting polygon needs to be defined by clicking two points (vector)

- If Custom shape has been selected, define the axis by a vector, or a point (if vertical) and click at a node of an existing GDL Toolbox polygon, or start drawing a polygon by clicking on a blank area. With a single click define the sweeping point of the polygon.

The GDL Toolbox elements may contain up to twelve cuthole definitions.

Note: GDL Toolbox can use Concave polygons as Cutting shapes!

All Cuthole definitions of the GDL Toolbox elements can be **modified** afterwards. Select the element you want to modify the cutpoly definitions within, and click the Cuthole tool.
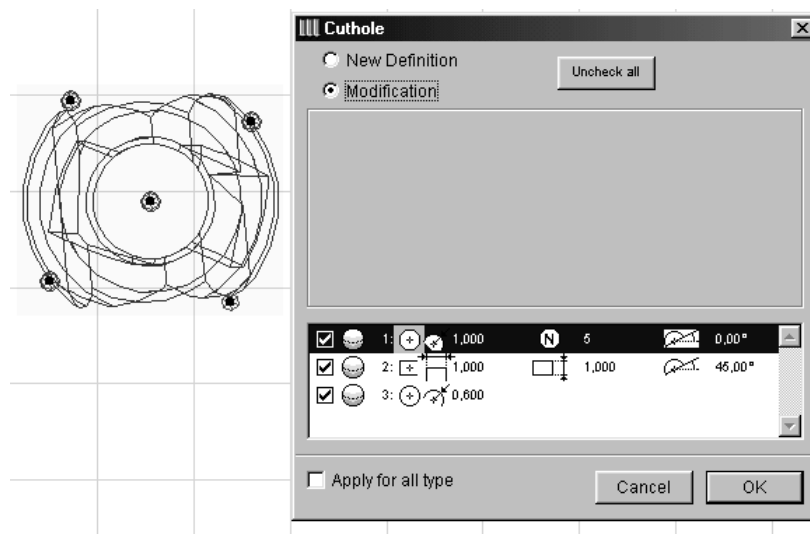
The Cuthole dialog box appears. By the radio buttons at the top of the dialog you can choose from defining new Cutholes, or modifying the existing ones. Choose Modify.

Now in the List of the dialog box all *cutting definitions are editable*. You can redefine the cuthole shapes, and modify all parameters.

By unchecking the rows, the *cuthole definitions can be removed* from the element.

Transformational operations

You can modify the spatial position of GDL Toolbox elements by using the GDL Toolbox transformational functions.

Axes, points and angles can be determined on the floor plan by defining points and vectors, for dragging, rotating and mirroring elements in the space.

You can predefine an angle in the toolbox, for rotations. If the arrow button is turned off, the here-defined numerical value will be used. If the value is zero, or the button is turned on, graphical input will happen.

In the toolbox you can set the number of the transformation to be performed.
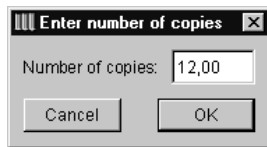
If the first button is enabled, the placement of the original element will be changed. If the second one is active, then keeping the original element in its place a copy of it will be transformed. In the case of the third button you can define the number of transformation in a small dialog box displayed. (This function is similar to ArchiCAD's Multiply... command.)

The Transformation commands are available in a pop-up menu. The last used transformation is available on the button, to offer an easier access to the frequently used commands.
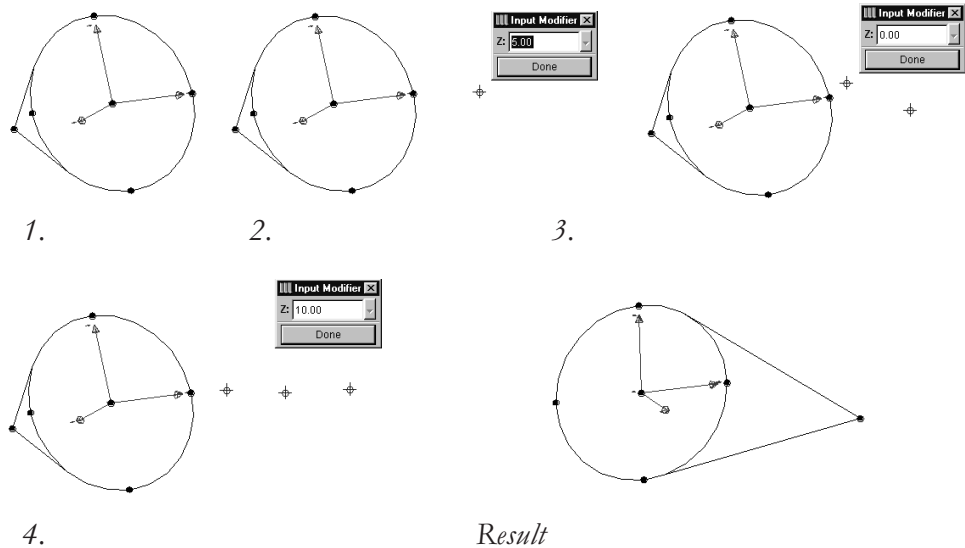
The following illustrations show, how the different transformations can be defined, and used:
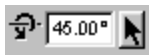
Rotation around a point

The following illustration shows the geometrical basics and the interactions of the rotation around a point:

1.   *2.*   *3.*

 4.   *Result*

Steps:

1. select the element(s)

2. definy the center point of the rotation

3. define the starting vector of the rotation angle

4. define the end vector of the rotation angle
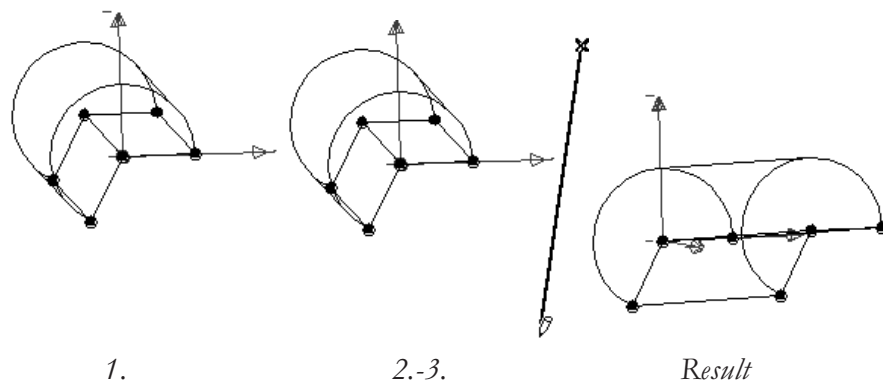
Rotation around an axis

Before rotating there are two options to define the rotation angle:

-    either by vectors set graphically

-    or by entering a number into the angle filed.

You can switch between the two methods using the arrow button next to the angle text field.

The following illustration shows the geometrical basics and the interactions of the rotation around an axis:

| 1. | 2.-3. | Result |

Steps:

1.select the element(s)

2.definy the starting point of the rotation axis

3.definy the end point of the rotation axis

(only if the rotation angle is defined graphically:)

4. define the starting vector of the rotation angle

5. define the ending vector of the rotation angle

Mirroring to a point

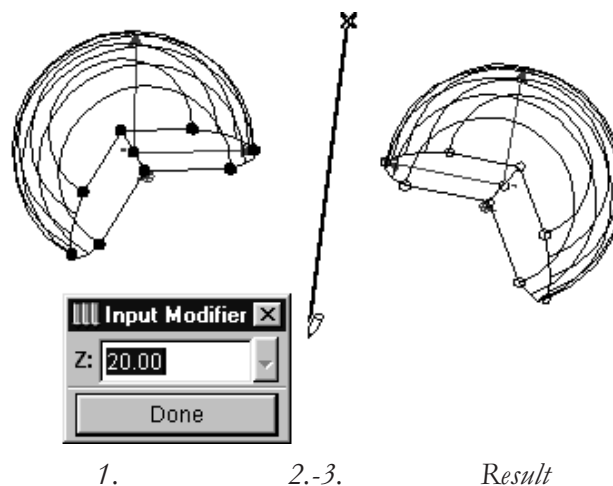The following illustration shows the geometrical basics and the interactions of the mirroring to a point:

| 1. | 2. | Result |
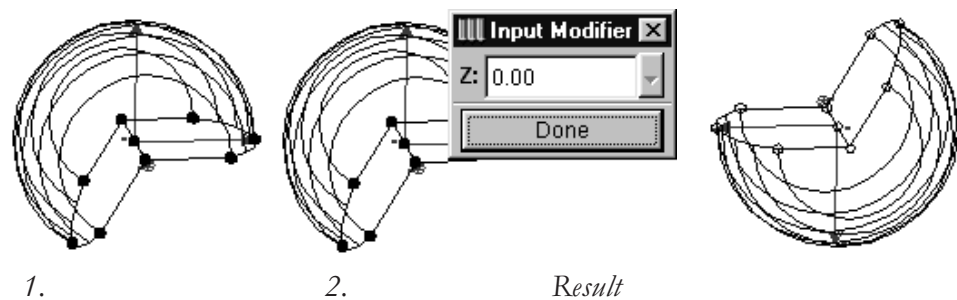
Steps:

1.select the element(s)

2.definy the center point of the mirroring

Mirroring to a line

The following illustration shows the geometrical basics and the interactions of the mirroring to a line:
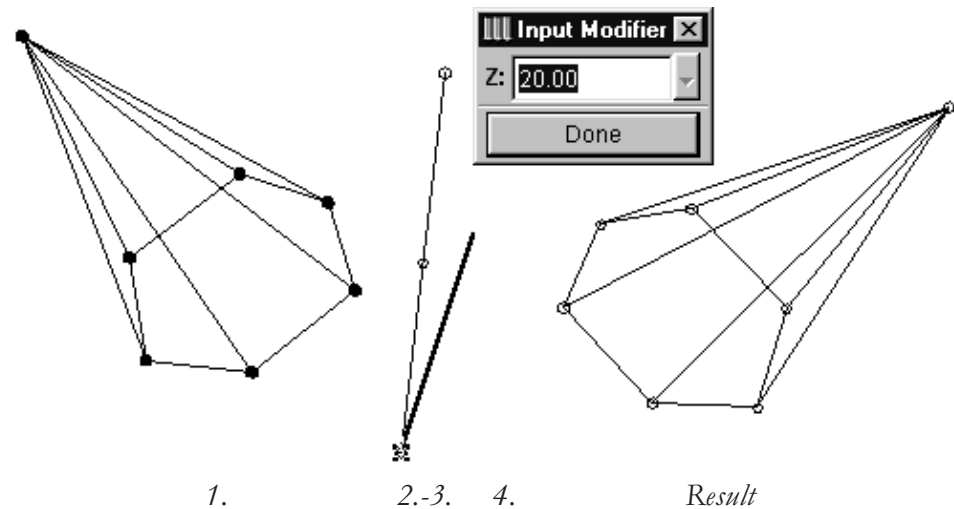

| 1. | 2.-3. | Result |

Steps:

1.select the element(s)

2.definy the starting point of the mirroring axis

3.definy the end point of the mirroring axis

Mirroring to a plane

The following illustration shows the geometrical basics and the interactions of the mirroring to a plane:

1.   2.-3.   4.   Result

Steps:

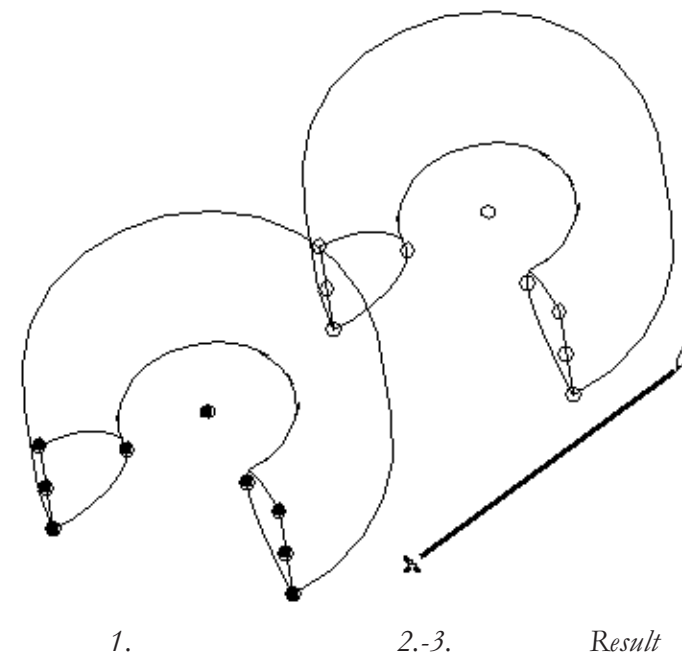1.select the element(s)

2. define the first point of the mirroring plane

3. define the second point of the mirroring plane

4. define the third point of the mirroring plane

the order of the points, (the orientation of the plane) has no effect on the mirroring.

3D Drag

The following illustration shows the geometrical basics and the interactions of the 3D dragging:

1.   2.-3.   Result

Steps:

1.select the element(s)

2. define the starting point of the dragging vector

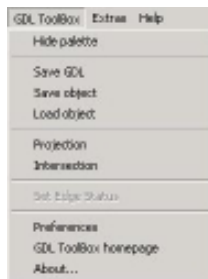3. define the endpoint of the dragging vector

For spatial definition of the points, enable the Input modifier or the z gravity.

Remove transformations

Use this command in order to reset the spatial transformations of the GDL Toolbox elements The selected elements' x-y plane will be parallel to the world x-y plane.

5. Chapter - Menu Commands

Show Palette/Hide Palette

This command allows you to start and close the GDL Toolbox program. It displays the toolbox of GDL Tools.

Save Object

This command allows you to create object type library parts from a set of GDL Toolbox element selected on the floor plan. In the appearing dialog box, you can name the object, and you can define the saving path of it.

All selected GDL Toolbox and ArchiCAD elements (except non GDL Toolbox library parts) can be saved this way. If there is one selected GDL Toolbox point with turned on Local Origin Checkbox, this point will be the *Global Origin* of the new saved object.

This command also supports the new bool functions and features of ArchiCAD 8. The selected model will be saved as a GDL Object containing all bool operation information and references.
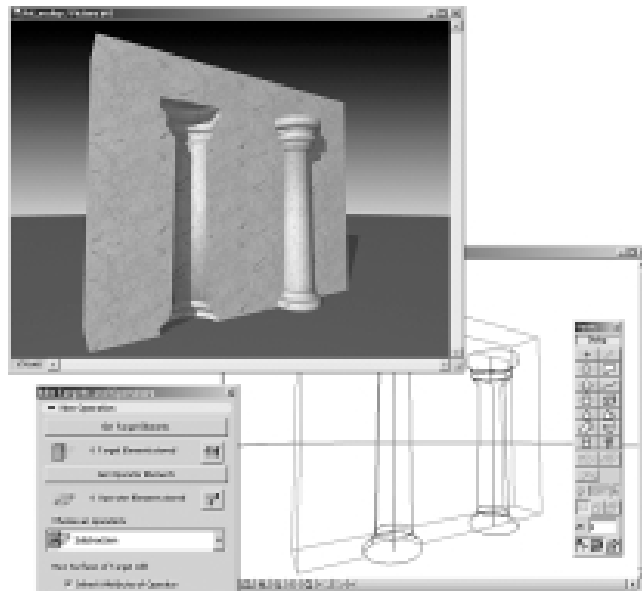
Signs not to be printed and the element's own nodes do not get into the saved library part.

Nine hotspots will appear at the corners and middle of the bounding block of the saved element. The element can be distorted in all three directions of space with the help of these points. If the selected GDL Toolbox elements contain GDL Toolbox Points, the program will put hotspots in their place both in 2D and 3D. You can specify your own nodes on the element with this method.

Saved Objects can be modified with the following parameters from ArchiCAD:
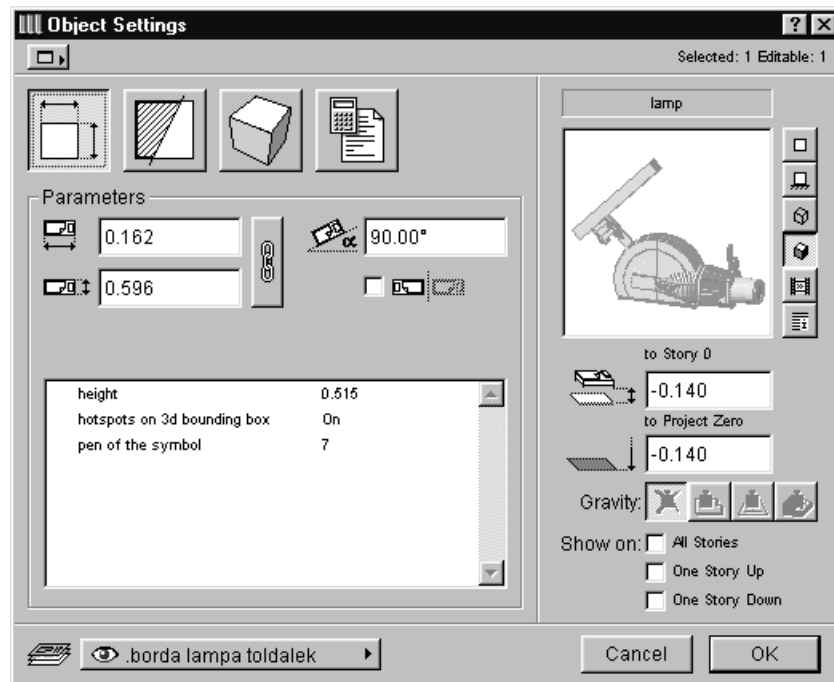
Object type library parts saved by GDL Toolbox can be restored in GDL Toolbox using the *Load Object...* command for further modification.

Save GDL

Selected GDL Toolbox elements can be exported into simple GDL scripts. During the export process, the content of the export can be influenced. The following information can be exported with the element's geometry:

§   Position of the Origin

§   Transformations

§   Attribute definitions

§   Cutting Information
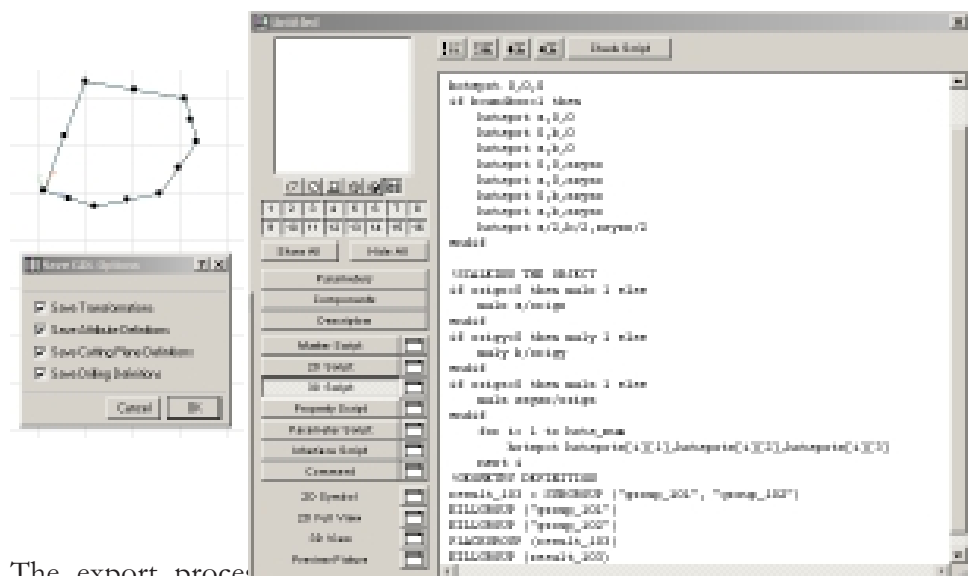
The export proce... ...processed using the standard ArchiCAD tools. This feature is a long awaited solution for GDL friends.

Load Object...

This command allow you to explode Object type elements saved by GDL Toolbox into components in order to further editing.

Place an element saved by GDL Toolbox on the floor plan, select it, and choose the *Load Object...*command. In the place of the selected element, its components will be restored according to settings available when saving. For resaving the element, use the *Save Object* command.

Projection

This command allows you to define projections of points, lines and planes. Special spatial places can be specified using this command. Select the elements participated in the projection and click the command. The program will place new point and line elements onto the projection places.
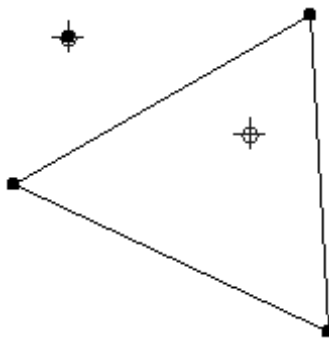
Projection of a point to a line

Select a line and a point. After clicking the command, GDL Toolbox places a point on the perpendicular projection of the point to the line.
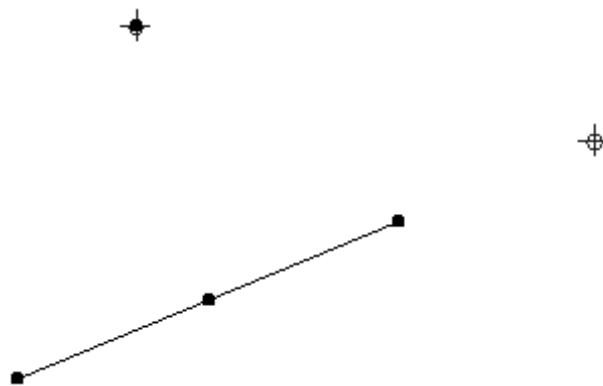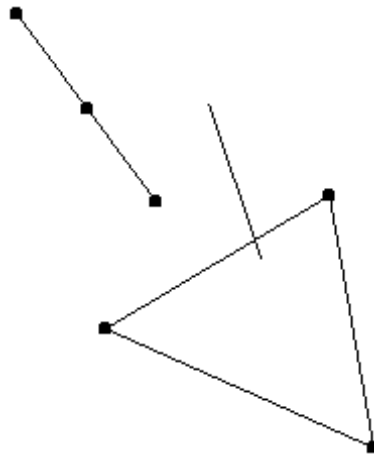
Projection of a point to a plane

Select a plane and a point. After clicking the command, GDL Toolbox places a point on the perpendicular projection of the point to the plane.

Projection of a line to a plane

Select a plane and a line. After clicking the command, GDL Toolbox places a line on the perpendicular projection of the line to the plane.

Intersect

This command allows you to define intersection places of points, lines and planes. Special spatial places can be specified with this command. Select the elements participated in the intersection and click the command. The program will place new point and line element onto the intersection places.
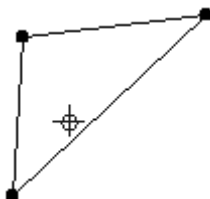
Line Line intersection point

Select two lines. After clicking the command, GDL Toolbox places a point on the intersection point. In case of evasive lines nothing will happen.

Line Plane intersection point

Select a line and a plane. After clicking the command, GDL Toolbox places a point in the point of poking of the line. If the plane and the line are parallel, nothing will happen.
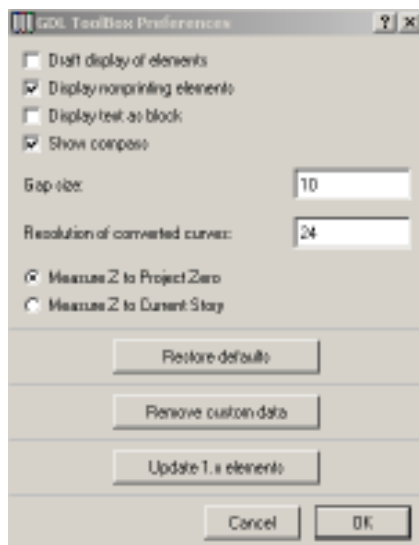

Plane Plane intersection line

Select two planes. After clicking the command, GDL Toolbox places a line in the intersection line of the two planes. If the two planes are parallel, nothing will happen.
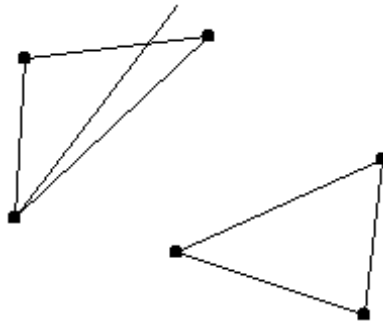
Preferences...

This command allow you to open the Preferences dialog in which settings concerning the program's function can be defined:

Keep Construction Elements

By checking this checkbox, all the remote elements will be kept at Element converting.

Draft Display of Elements

By checking this checkbox, all curved elements will be displayed using a low-resolution value. As this checkbox is turned off, all the resolution parameters will be reset to their original values.

Display nonprinting Elements

By checking this checkbox, all the nonprinting parts of the elements will be shown (Coordinate axes, gaps...)

Display Texts as Blocks

By checking this checkbox, all the texts will be displayed as simple blocks.

Gap Size

Here you can set up the size of the gaps of the elements. Gaps display the nodes of the defined elements on the floor plan, to make it found easier.

Resolution of Converted elements

Here you can set up the resolution for curved segments of element Conversations

All these settings will take effect on all placed GDL Toolbox elements, and will be valid for the elements created afterwards.

These settings do not change the main parameters of the elements. It means, previous settings can always be restored.

### Removing GDL Toolbox specific data from Saved Objects

The Objects saved by GDL Toolbox contains custom data, in order to make the reload possible. If generating standard ArchiCAD library parts, if no more modifications in GDL Toolbox are needed, this information is no more required. GDL Toolbox offers a simple solution to remove this custom data from the library parts.

Select the Library parts saved by GDL Toolbox. Open the preferences dialog. Choose the Remove Custom data button. If the custom data is removed, the size of the objects will be reduced.

> *Note: If custom data is removed, it is no more possible to load and edit it using GDL Toolbox.*

### Convert GDLTB 1.2 elements
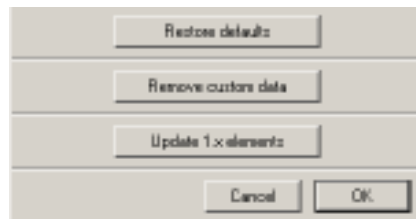
Previous versioned GDL Toolbox objects are not able to work automatically with GDL Toolbox 2.0If you are using an ArchiCAD project containing GDL Toolbox objects created with GDL Toolbox 1.0 or 1.2, use this button, to convert these library parts to GDL Toolbox 2.0 version.After conversion all functions of GDL Toolbox 2.0 will be available for these elements.

Set Edge Status

You can modify the status values of placed Polygon and Prism segments, using the Set Edge Status command. Select the element, choose the command, and click on the midpoint of the edge you want to modify. The following Status dialogs appear, depending on the selected element.
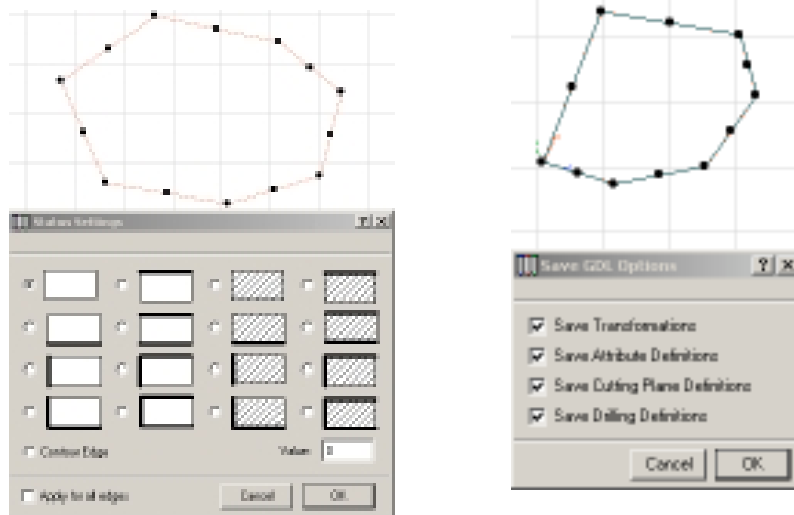
if polygon is selected   if prism is selected

You can modify the edges one by one, but you have also the possibility to set the status of all edges the same time.

6. Chapter - Keyboard Commands

Controlling inputs

There are three methods, which control the working with GDL Toolbox. If no editing operation is going on, these methods can be enabled or disabled through the toolbox. During an operation the buttons are not available. The following keyboard commands serve to switch these methods:

z value input (Input modifier)	**Alt + Ctrl + 1**
z gravity	**Alt + Ctrl + 3**
Dialog input	**Alt + Ctrl + 2**

While the definition or modification of polygon, polyline, or the other elements based on them, the following keyboard shortcuts are available:

o   While the definition, the **Backspace** button delets the previously drawn segment

o   While the graphical modification of a cornerpoint, the **Backspace** button deletes the point.

o   While the graphical modification of a cornerpoint of a hole, the **Ctrl Backspace** buttons delete the hole.

o   In a closed polyline, while the graphical modification of a cornerpoint, the **Ctrl Backspace** buttons open up the polyline.

Selection methods

From the aspect of ArchiCAD GDL Toolbox elements are object type library types, so ArchiCAD do not assure simple method for differential selection of the elements. If you would like to select GDL Toolbox elements of the same type simultaneously, click the element's button on the palette while pressing the SHIFT key. If you want to withdraw a given type of element from the selection, click the button with the CTRL key.