



Parametric Tools



Macintosh® | Windows®

Document Created: March 8, 2003
Last Update: January 23, 2007
Last Printing: January 23, 2007

Contents



Legal

License Agreement	xv
-------------------------	----

Reference

2D and 3D Drawing Tools

Introduction.....	5
Drawing in Draft and Sculpt modes.....	5
Using drawing tools	7
Snaps menu constraints.....	7
The toolbox.....	9
Arc tools	9
Arc Data Types.....	9
Drawing arcs and Curved planes	10
Editing arcs and curved planes	12
Applying attributes to arcs and curved planes.....	14
Camera Path Tool	15
Editing a walkthrough Path.....	17
Curve tool.....	18
Drawing curves and curved planes	19
Editing curves and Curved planes.....	20
Dimension tools.....	22
Applying commands to dimensions.....	29
Setting up dimension tools	30
Ellipse tools	35
Drawing Circles, ellipses and cylinders	36
Editing Circles, Ellipses, and cylinders.....	38
Library tool.....	40
Light Source tools.....	45
Line tool.....	48
Drawing lines and planes	49
Editing lines and planes	50
Pan Tool.....	51
Polygon tools.....	52
Drawing polygons and columns	52
Editing polygons and columns.....	54
Polyline tools	56

Drawing polylines and planes	56
Editing polylines and planes	58
Rectangle tools	60
Drawing rectangles and cubes	61
Editing rectangles and cubes	64
Selection tools	66
Text Tools	69
Editing text	71
Working in text edit mode	72
Applying attributes to text	74
Zoom tool	75

Render tools

Render tools	79
Horizontal Focal Point tool	79
Vertical Focal Point tool	80
Dual Focal Point tool	81
Perspective Render tool	82
Isometric Render tool	82

Object attributes

Object attributes	85
How attributes apply to objects	85
Attributes of 2D objects	86
Attributes of 3D objects	87
Using the Attributes Bar	88
Using the Pen and Fill palettes	89
Pen attributes	90
Pen Color	91
Pen weight	93
Arrowheads	94
Pen Style	96
Fill attributes	98
Fill Color	99
Fill pattern	101
Fill hatch	104
Surface material	107

Toolbars

Toolbars	114
Action buttons	115
Align toolbar	116
Combine toolbar	119
Extrude toolbar	121

Mirror toolbar	123
Move toolbar	123
Path toolbar	124
Reshape button	126
Rotate toolbar	126
Scale button	127
Trims toolbar	127
Snap buttons	129
Help bar	130
Info bar	131
Layer bar	132
Mode pop-up menu	133
Status bar	134
Display Options pop-up menu	134
Extrusion Format buttons	135
Relative View pop-up menu	136
Clipping Plane pop-up menu	137
3D Axis pop-up menu	137
3D Plane pop-up menu	139
View Options pop-up menu	140
Zoom bar	141
Saving custom zooms	143

File menu commands

File menu commands	147
About DCAD VectorSpace	147
Close	148
Import	148
Import options.....	149
Import file formats.....	150
Import options.....	151
New	152
Open	152
Opening documents	153
Page Setup (Mac OS) / Printer Setup (Windows)	153
Print.....	154
Printing documents.....	154
Quit (Mac OS) / Exit (windows)	154
Revert.....	155
Save	155
Save As	156
File Formats	156
Export Options.....	158
Set Print Area.....	160

Edit menu commands

Edit menu commands	165
Clear	165
Copy	166
Copy View to Draft	167
Hidden Line	168
Solid	169
Cut	170
Duplicate	170
External Reference	171
Attach	173
Reload	173
Bind	174
Detach	174
Path	175
Scale	175
Create Frame	176
Show/Hide Frame Borders	177
Update Frame Layers	177
Paste	178
Paste Options	179
Preferences Menu	181
Preferences Dialog	184
General tab	185
Tools tab	189
Desktop environment	191
Recalculate	192
Redo	194
Reshape	194
Select	196
Selection methods	196
Select All	198
Show Clipboard / Hide Clipboard	198
Undo	198

Layout menu commands

Layout menu commands	203
Centerpoint submenu	203
Custom Centerpoint	204
Default Centerpoint	205
Delete Centerpoint	205
Edit Centerpoint	206
Save Centerpoint	207

Set Position	207
Display Options submenu	208
Display Visible Layers	209
Display Active Layer	210
Display Selected Objects	210
Display Layer Colors	210
Display Pen weight colors	211
Display 2D & 3D Mode Colors	212
Display Locked Objects in Gray	213
Display by Layer Creation Order	213
Grid Setup	213
Hide Grid / Show Grid	215
Output Setup	215
Document Scale area	216
Pages area	217
Show Page Breaks	218
Snaps submenu	218
Create Snap Objects	219
Snap to Grid	220
Snap to Objects	220
3D Axis submenu	221
Working with spin extrusion Axes	221
Custom 3D Axis	222
Default 3D Axis	222
Setting a spin extrusion axis	223
Delete 3D Axis	226
Save 3D Axis	227
3D Plane submenu	228
Working with Extrusion planes	229
Custom 3D Plane	230
Default 3D Plane	230
Defining Extrusion planes	231
Notes on defining extrusion planes	236
Delete 3D Plane	237
Save 3D Plane	238
Toolbars	239
Units Setup	240

Object menu commands

Object menu commands	245
Align	245
Align options	246
Arrange submenu	249
Bring to Front	250
Send to Back	250

Shuffle Backward	251
Shuffle Forward	252
Chain	252
Combine submenu	253
Intersect	254
Punch from Back	256
Punch from Back & Trim	257
Punch from Front	258
Punch from Front & Trim	260
Unite	261
Offsetting complex shapes	262
Copy To Layer	263
Group	264
Extrude submenu	265
Extrude Options	266
Linear extrusion tab	267
Spin extrusion tab	268
Sweep extrusion tab	271
Linear	275
Spin	277
Sweep	279
Sweep Sections	281
Path submenu	283
Convert To Polygon	283
Offset	284
Round	285
Smooth	286
Unsmooth	287
Position submenu	287
Linear Array	287
Mirror	289
Mirror a Copy	290
Move	291
Move a Copy	292
Polar Array	292
Rotate	294
Rotate a Copy	295
Scale	296
Send To Layer	297
Trims submenu	297
Chamfer	298
Extend	299
Fillet	300
Join	301
Trim	302
Unchain	302

Ungroup.....	303
--------------	-----

Rendering menu commands

Rendering menu commands	307
About Render mode	307
The Render mode toolbox.....	308
Hidden Line	309
QuickTime Movie.....	310
Camera Paths	310
Walkthrough options.....	312
QuickTime VR	313
Rendering Options	314
Screen tab	315
Lighting tab.....	319
Sunlight tab	321
Solid	323
Stereoscopic.....	326
Walkthrough	327
Wireframe.....	328

View menu commands

View menu commands	333
Orthogonal View commands	333
Top	333
Bottom	334
Front.....	334
Back	334
Left	335
Right.....	335
Clipping Plane submenu	335
Define Clipping Plane.....	336
Full View.....	337
Sectioned View.....	337
Refresh.....	338
Relative View submenu.....	338
Custom Relative View	339
Default Relative View	339
Define Horizontal Angle.....	340
Define Numerically	340
Define Vertical Angle.....	341
Delete Relative View	341
Save Relative View	342
Snapshot submenu	343
save Snapshot.....	344

Choosing snapshots	344
Delete Snapshot	345
View Options submenu	346
View Options in Draft mode	346
View Options in Sculpt mode	348

Window menu commands

Window menu commands	353
Using Show / Hide window commands	353
Hide Draft / Show Draft	355
Hide Sculpt / Show Sculpt	356
Hide Render / Show Render	356
Tile	357
Analysis Manager	357
displaying data in the analysis manager	358
Selecting data types	361
Class Manager	365
Layer Manager	367
Layers in Draft and Sculpt modes	367
Using the layer manager	369
Activating and Selecting Layers	370
Moving and copying objects in the Layer Manager	371
Layer options	372
Using Layer Manager commands	374
Using layer sets	378
Using the Layer Manager to select objects	380
Tool Manager	380
DCAD VectorSpace Tool Parameters	382
Using the DCAD VectorSpace parametric tools	384
DCAD VectorSpace Tool Palettes	386
Using the DCAD VectorSpace Tool Palettes	389
DCAD VectorSpace Parametric Tool Icons	389
Selecting open DCAD VectorSpace documents	390
Properties Manager	391
Attributes tab	394
Coordinates tab	397
Coordinates tab options	397
Info tab	402
Info tab options	403
Tool tab	404
DCAD VectorSpace tools and settings	405

Appendices

Glossary

Glossary	411
----------------	-----

Parametric Text Format (PTF)

Parametric Text Format (PTF)	421
Introduction.....	421
Creating and using PTF files	422
Creating PTF files with a text editor	425
Creating PTF files in a spreadsheet program.....	427
PTF Reference	427
The PTF file structure.....	427
Sample PTF file structure.....	428
General syntax for object descriptions	429
Simple Object descriptions.....	430
Simple Object descriptions.....	431
Boolean Object descriptions.....	436
Boolean object descriptions	436
Grouped Object descriptions.....	436
Grouped Object descriptions.....	437
Container descriptions.....	439
Dimension Object descriptions.....	439
Dimension object descriptions.....	439

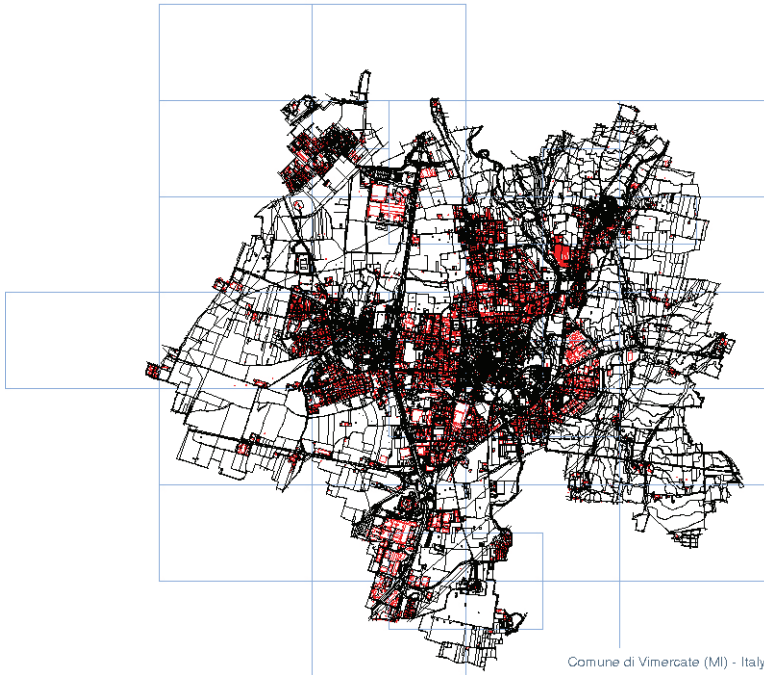
How to...

How to...	445
-----------------	-----

Index

Index	455
-------------	-----

Legal



Comune di Vimercate (MI) - Italy

In this chapter:

- License Agreement
- Licenses, Trademarks and Copyrights



License Agreement

THIS IS A CONTRACT. BY OPENING ANY OF THE SEALED SOFTWARE CONTAINERS, YOU ACCEPT ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT. If you do not agree with the terms and conditions of this Agreement, return this entire package and the UNOPENED software containers to your place of purchase for a full refund.

1. Definitions

- (a) “DOTSoft” means DOTSoft Inc. **DOTSoft Inc.**, a Florida Corporation.
- (b) “Software” means the software programs included in this package.
- (c) “Product” means all Software, manuals and other related documentation included in this package as well as all future related updates supplied by **DOTSoft Inc.**

2. License – **DOTSoft Inc.** grants to you and you hereby accept a license to use the Product and all related materials delivered with this AGREEMENT as follows:

- (a) The Software may be installed in one computer and may be used by more than one person on that computer; however, in no event shall two or more persons use the Software at the same time. This restriction applies regardless of how many language versions (e.g. English, German) or media copies (e.g. diskette or CD-ROM) may be included in this Product.
- (b) You may make one copy of the Software in machine-readable form for archival backup purposes only. As an express condition of this allowance you must reproduce on each backup copy any copyright notice or other proprietary notice that is on the original copy supplied by **DOTSoft Inc.**.
- (c) You may transfer the entire Product and all rights granted herein on a permanent basis provided you retain no copies, the recipient agrees to the terms of this Agreement, and you notify **DOTSoft Inc.** in writing of the transfer of ownership.

3. Restrictions

- (a) You may not make or distribute copies of the Product. You should be aware that it is unlawful to copy, reproduce, or transmit any part of the Product in any form or by any means (including translation to another language, computer language, or format) except as permitted by the Copyright Act of the United States (Title 17, United States Code). You are permitted to write the contents of the Software into the machine memory of your computer so that the software can be executed.
- (b) You may not install this program on a network server nor lend usage of a copy of this software with metering software. These types of usage require a special license, unless a copy of this software is owned for each user on that network or each computer connected to that network. For information on this expanded license usage see section 4, Supplementary Licenses in this agreement.
- (c) In order to protect **DOTSoft Inc.** trade secrets contained therein which may be revealed by such action, you may not reverse engineer, decompile, disassemble or otherwise reduce the Software to any human readable or perceivable form.
- (d) You may not modify, rent, resell for profit, distribute or create derivative works based on the Software or any part thereof.
- (e) You agree not to export or reexport the Product into any country prohibited by the United States Export Administration Act.

4. Supplementary Licenses – If you wish to enter into a site license, network license or concurrent-use license agreement please contact **DOTSoft Inc.**

-
5. **Termination** – Any failure to comply with the terms and conditions of this Agreement will result in automatic termination of this license. Upon termination of this license for any reason, you agree to destroy all copies of the Product.
 6. **Software Updates – DOTSoft Inc.** may from time to time, at its own discretion, provide you with updates to the manuals and/or Software. **DOTSoft Inc.** reserves the right to provide these updates for a fee. You may refuse to accept the updates. By accepting the updates, you agree to destroy all prior copies and versions of the Software and manuals (if applicable). Only then will the License granted to you by this Agreement transfer to the updated Software.
 7. **Ownership** – This license gives you limited rights to use the Software. Although you own the disks and CDs on which these are recorded, you do not become owner of the Software to which **DOTSoft Inc.** and/or its licensors retain all title to. All rights not specifically granted herein, including but not limited to Federal and International Copyrights, are reserved worldwide by **DOTSoft Inc.**.
 8. **Limited Warranty and Disclaimer, Limitation of Remedies and Damages** – You hereby acknowledge that you are solely responsible for selecting the Product and that the Product may not satisfy all your requirements or be free from defects. **DOTSoft Inc.** specifically does not warrant that the Software will operate uninterrupted or error free. You therefore agree to license the Product “AS IS.” Notwithstanding the foregoing, **DOTSoft Inc.** warrants to you (the original purchaser), that if you discover physical defects in the media on which the Software is recorded, or in the manuals distributed with the Product, **DOTSoft Inc.** will replace the media or manuals at no charge, provided you return the defective items, postage prepaid and with proof of purchase, within 90 days of the date of original purchase. Your exclusive remedy for breach of warranty will be the replacement of the diskettes, CDs or manuals or the refund of the purchase price.

DOTSoft Inc. reserves the right to revise the Product without obligation to notify any person of such revision. In no event shall **DOTSoft Inc.** or its developers, directors, officers, employees or affiliates be liable to you for any indirect, special, incidental, or consequential damages (including damages for loss of business profits or goodwill, business interruption or loss of business information), resulting from any defect in the Product whether foreseeable or not, arising out of the use or inability to use the Product. **DOTSoft Inc.**'s liability to you or others for actual damages for any cause whatsoever, will in no event exceed the lesser of US\$500 or the amount paid by you for the Product that caused the damages. In particular, **DOTSoft Inc.** shall have no liability for any data stored in or used with **DOTSoft Inc.** Products, including the cost of recovering such data.

EXCEPT AS SPECIFICALLY STATED HEREIN, **DOTSoft Inc.** MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO THE SOFTWARE, MEDIA, OR MANUALS INCLUDING (BUT NOT LIMITED TO) IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHERS, ORAL OR WRITTEN, EXPRESSED OR IMPLIED. IF APPLICABLE LAW IMPLIES ANY WARRANTIES WITH RESPECT TO THE PRODUCT, ALL SUCH WARRANTIES ARE LIMITED TO (90) NINETY DAYS FROM THE DATE OF DELIVERY. No **DOTSoft Inc.** dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty.

Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

9. **U.S. Government Restricted Rights** – This **DOTSoft Inc.** Product is “Restricted Computer Software.” Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 or subparagraphs (c)(1) and (2) of the Commercial Computer Software - Restricted Rights at 48 CFR 52.227-19, as applicable. The manufacturer is **DOTSoft Inc.**

-
10. **General** – This agreement shall be governed by the laws of the State of Florida. This document contains the entire agreement between you and **DOTSoft Inc.** with respect to the subject matter hereof and supersedes all prior agreements between you and **DOTSoft Inc.**. All questions concerning this agreement should be sent to: **DOTSoft Inc.**

Licenses, Trademarks and Copyrights

DCAD VectorSpace software Copyright 1998-2007 DOTSoft Inc. All rights reserved worldwide.

DCAD VectorSpace is a trademark of the DOTSoft Inc. – Virtual Lab s.a.s. – Aplicaciones GraphiCAD C.A – bitWAVE¹

DCAD line, DCAD traslator, DCAD optimizer and DCAD technical are trademarks of the DOTSoft Inc. – Virtual Lab s.a.s. – Aplicaciones GraphiCAD C.A. – bitWAVE and may be registered in certain jurisdictions.

Software Copyright 2003–2006 Virtual Lab s.a.s..

Parametric Tools Technology –Software Copyright 2002–2007 DOTSoft Inc.. Licensed to Virtual Lab s.a.s and Aplicaciones GraphiCAD C.A..

Virtual Lab Parametric Tools – Software Copyright 2003–2007 Virtual Lab s.a.s..

GraphiCAD Parametric Tools – Software Copyright 2003–2007 Aplicaciones GraphiCAD C.A.

Windows, Windows 98, and WINDOWS XP are trademarks of Microsoft Corp. Mac OS, QuickDraw, QuickDraw 3D, QuickTime, QuickTime VR, TrueType and System 7 are trademarks, and Apple, LaserWriter, Macintosh and Power Macintosh are registered trademarks of Apple Computer, Inc. PostScript is a trademark of Adobe Systems, Inc. which may be registered in certain jurisdictions.

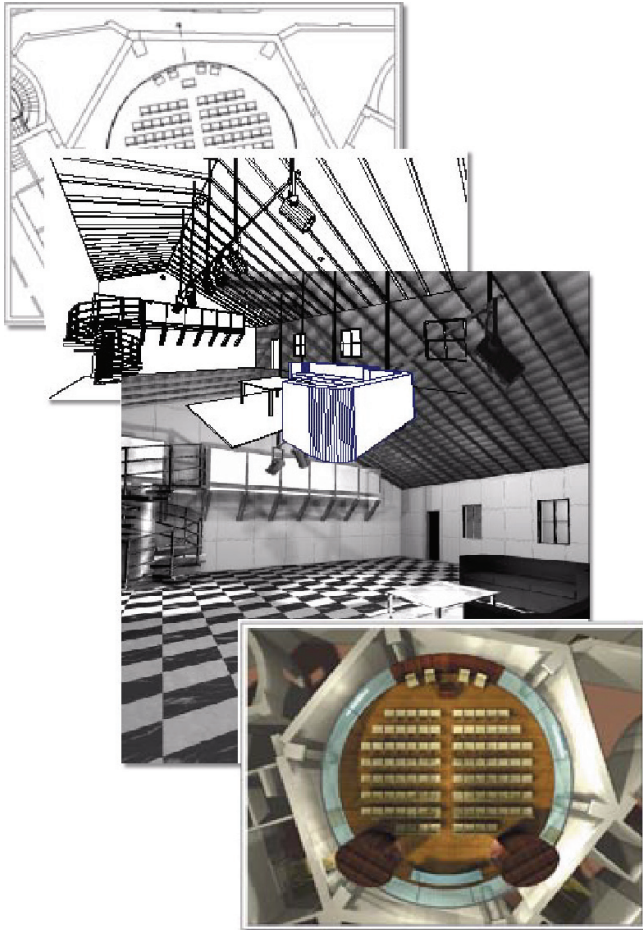
All other brands and product names are the property of their respective holders.

1. **DOTgroup** (Pending Consortium)

Distributors

Latin-america:	Aplicaciones GraphiCAD C.A. Att. Arq. Hernan Pisani Lander Software Designer-Product Manager Av. Cuyuní, Res. Nana, Suite#2 Colinas de Bello Monte Caracas, 1060 Venezuela América del Sur Tel/Fax: 58 212 7530106 Email: graphicad.ca@gmail.com WebSite: http://www.graphicad.net
Italy	bitWAVE Strada Statale nr.14 - 23875 Osnago (LC) - Italy Tel. 039-92.80.600 Fax 039-92.80.171 Web: www.bitWAVE.it E-mail: info@bitWAVE.it
U.S.A.	Dotsoft Inc. Att. Hernan Pisani CCS 19010 11010 NW 30 th St, Suite 104 Miami, Fl 33172 - 5032 USA. eMail: dotsoft.inc@gmail.com

DCAD VectorSpace Parametric Tools



In this Chapter:

- Tool Manager
- DCAD VectorSpace Tool Palettes
- DCAD VectorSpace Tool Palettes
- Basic Tool Sets



Macintosh® | Windows®

Tool Manager

Mode: Draft, Sculpt

This version of DCAD VectorSpace includes a new feature: Parametric Tools. The use and management of these new tools requires the addition of a new palette: The Parametric Tool Manager. A few definitions are in order before proceeding:

Parametric Tool. A tool whose execution and results are regulated by one or more user modifiable parameters.

Tool Folder. A folder within the DCAD VectorSpace installation folder that contains the DCAD VectorSpace parametric tool files.

Tool Materials Folder. A folder within the DCAD VectorSpace installation folder that contains any materials file as that may be required and/or used by the DCAD VectorSpace.

To open the Parametric Tool Manager Palette:

Select the Windows > Tools Manager... Option.

DCAD VectorSpace displays the Parametric Tool Manager.

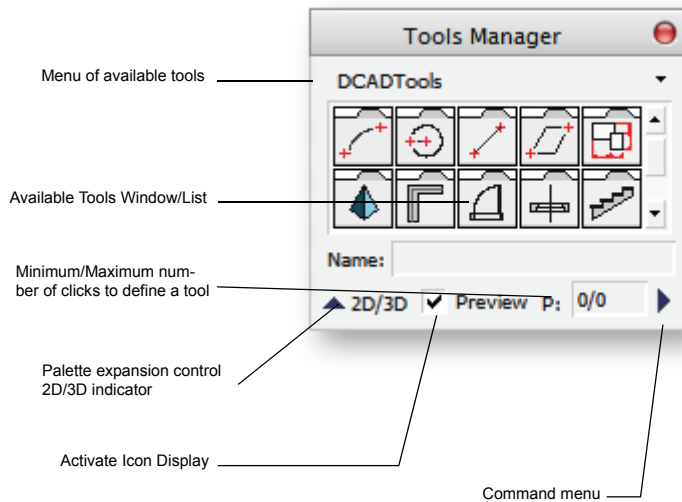


Figure 1.- Tool Manager

Several display and control areas appear in the Tool Manager palette:

Available Tools Window/List. Contains a display/list of the available DCAD VectorSpace para-

metric tools. The window reflects the folder/file hierarchy of the Tool Folder:

Note: If the Show Icons option is active the tools will be identified by a descriptive icon and folders are identified by conventional folder icons.



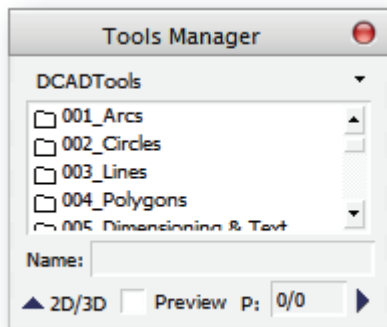




Figure 2.- Tool Manager - List View

- Individual tools are marked with the standard file icon: 
- Folders that contain families of tools are marked with the standard folder icon: 

To select a DCAD VectorSpace Tool: •Click on the tool's icon.

Note: You may need to use the scroll bar controls if the desired icon is not visible.



To open a DCAD VectorSpace tool folder: Double click on the desired folder's icon in the available tools display area.

Note: You may need to use the scroll bar controls if the desired folder is not visible.



DCAD VectorSpaceTool Parameters

In regular use, parametric tools require the input of one or more values (parameters) that will control the shape, size, location, material, etc. of the object created by the selected tool.

The Available Tools menu will show the name of the folder that contains the folder/tools displayed in the list.

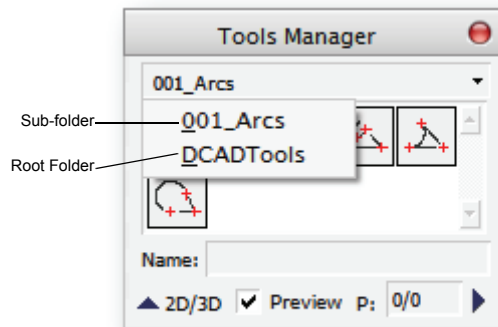


Figure 3.- Available Tools menu

Available Tools menu. This menu always shows the name of the folder that contains the tools and/or folders displayed in the manager. When the menu is opened the open folder hierarchy will be displayed in reverse order.¹

To rise in the tool folder hierarchy

1. If the Tool Manager Palette is closed, select the Windows > Tool Manager... option.
2. Open the Available Tools menu and select the name of the folder you desire to open.

1. The last name in the menu list options is the root DCAD VectorSpace tools folder.

To show the modifiable parameters of a parametric tool: Click on the expansion control in the lower left corner of the tool palette.

The palette will open to show a list with all the available parameters for the selected tool, as

well as an area where the modifiable parameter's values may be input.

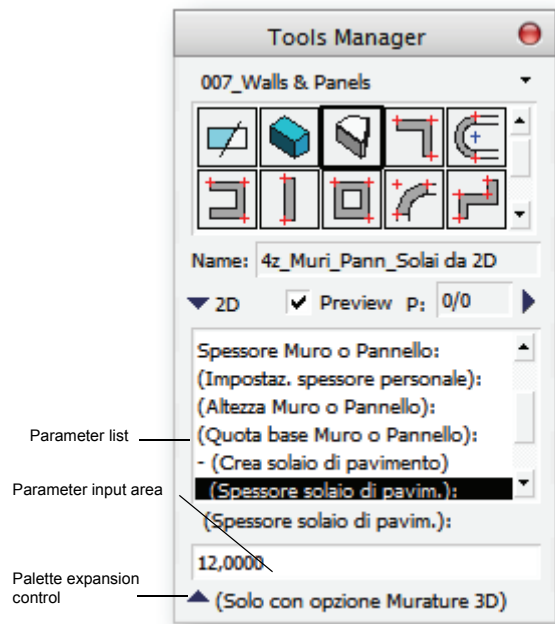


Figure 4.- Tool Manager - Parameters

Parameter value types

There are several parameter value types and several ways to input them.

Logic or Boolean Values. Are those that admit only two state values of the On/Off, True/False, Yes/No types

These values are input by checking or clearing the checkbox that appears in the parameter input area.

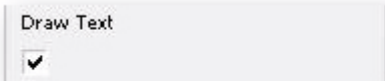


Figure 5.- Logic or Boolean parameters

Type-in values. Are numerical or text values typed into a text box in the parameter input area. Below this box a hint will be offered with the range and/or units of the expected values.

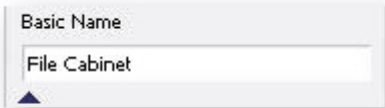


Figure 6.- Type-in parameters

Menu-List Values. These are selected from a pop-down menu list.

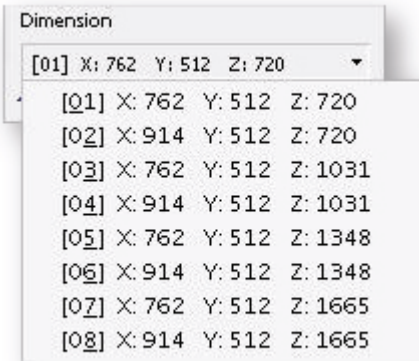


Figure 7.- Menu-List Values

Note: Most parameter values will have a default value that will be inserted when no particular value is input by the user.



Help Images

Besides the Available Tools list and the selected tool's parameter list, the tools palette may show, at the tool designer's sole judgement some kind of help image to aid in the use of the selected tool.

To show help images for the selected tool: Click on the expansion control in the lower left corner of the tool palette.

the palette will expand again to show any available help images for the selected tool.

Note: If the tool designer has not provided any help images, the help area will appear empty.

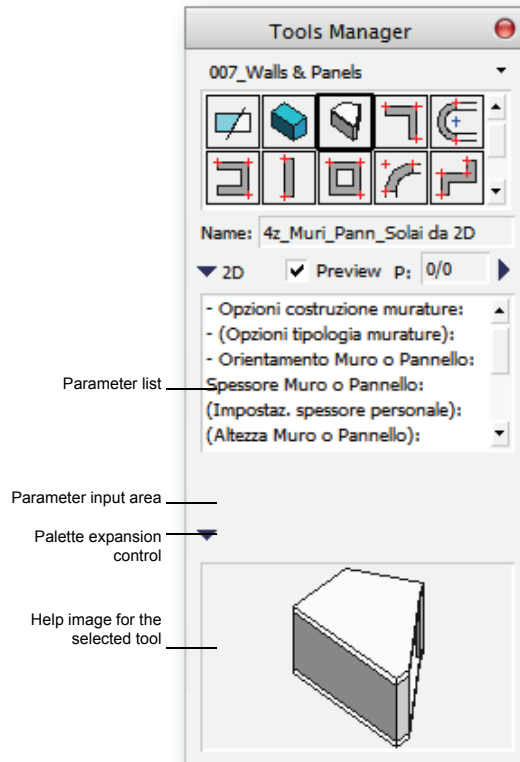


Figure 8.- Tool Manager - Help Images

To Hide help images for the selected tool:

Click on the close control.



Using the DCAD VectorSpace parametric tools

Note: The instructions given here are of a General Nature. Each available tool has individual use instructions supplied either in the Included **Tools Manual** or in the support documents supplied by the vendor for third party tools.



To use a parametric tool

1. If the Tool Manager palette is closed, select Windows > Tool Manager...

The Tool manager palette is displayed.

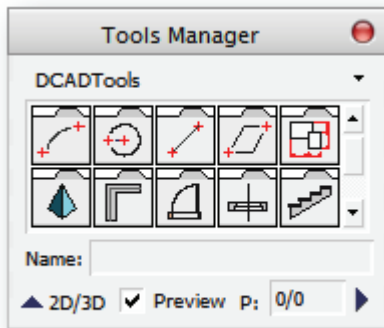


Figure 9.- Tool manager palette

- If the Show Icons option is active, the palette will show icons of the available tools.
2. If necessary, open the folder that contains the desired tool. See: **To open a DCAD VectorSpace tool folder**, page 4
 3. Click on the desired tool's icon
 - The tool's name will be displayed.
 - In the lower left corner of the palette you will see the expression **2D/3D** if the tool is available in both draft and sculpt modes.
 4. If the parameter list and input area is not open, click on the expansion control in the lower left corner of the palette. ▲

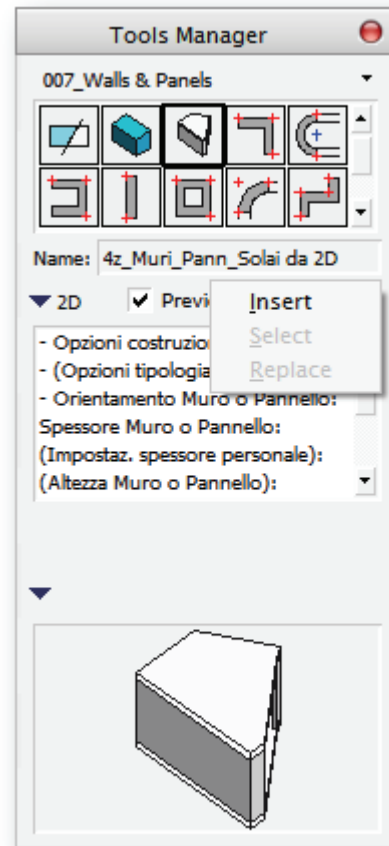


Figure 10.- Tool Manager - Insert

5. Select the parameter to be modified from the list of available parameters.
6. Insert the value required for the selected parameter. See **Parameter value types**, page 5.
7. Repeat steps 5 and 6 for any other parameter that requires value input or modification.
8. Select Insert in the palette's command menu.

Note: If the tool does not require definition of construction points and/or vectors, the tool will be immediately applied. ✓

-
9. Move the cursor from the palette to the working area. The cursor will now take the shape of a cross.
 10. Click on the location of all the required construction points for the tool.

Note: The number of points required will be shown in the **Pts.** box in the palette.



The value will be shown in the format **n/m** where **n** is the minimum and **m** is the maximum number of points required.

The required position and definition order of the construction points are usually illustrated by the help images displayed in the palette.

11. Once finished, the tool will draw or execute its defined function.

DCAD VectorSpace Tool Palettes

DCAD VectorSpace Tools can also be held in specialized floating tool palettes, similar to the standard tool palettes.

The available¹ palettes are selected from the **DCAD VectorSpace** Palettes submenu of the Windows Menu.

1. The actual available **DCAD VectorSpace** Tool Palettes in your installation may be different from those shown here. Ask your salesperson or **DCAD VectorSpace** representative for details

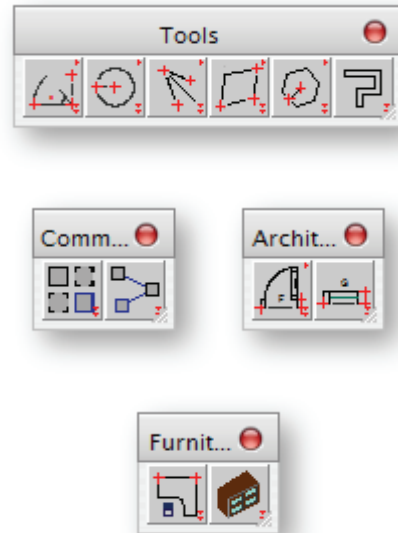


Figure 11.- DCAD VectorSpace Tool Palettes - a sampling

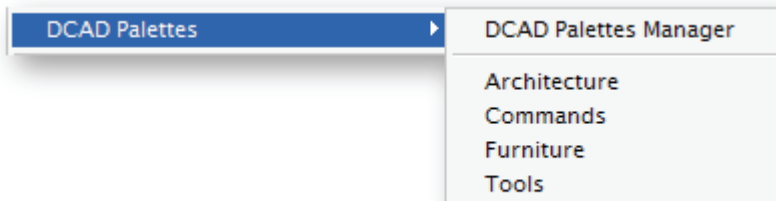


Figure 12.- DCAD VectorSpace Tool Palettes menu

To show/Hide a DCAD VectorSpace Tool Palette:

Select the desired palette's name from the Palette submenu in the Windows menu.

Note: The active palettes will appear with a checkmark to the left of their names in the menu listing.



To close an open palette: Click on the close box in the palette's title bar

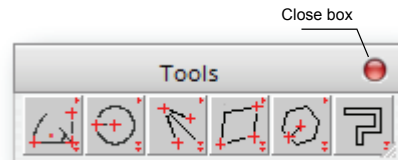


Figure 13.- DCAD VectorSpace Tool Palettes - close box

From the **DCAD VectorSpace** Palettes menu you may also open the **DCAD VectorSpace** Palettes

Manager Dialog, that you may use for several other functions regarding palette availability and visibility.

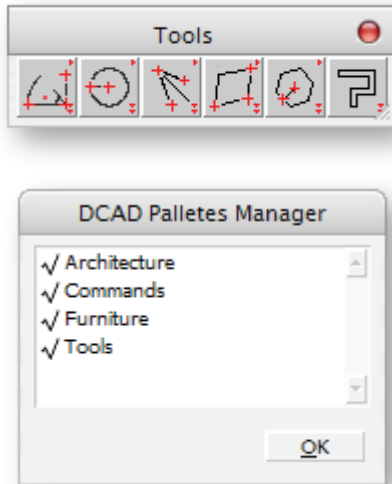


Figure 14.- DCAD VectorSpace Tool Palettes Manager

To show/hide several DCAD VectorSpace Tool Palettes

1. Select the **DCAD VectorSpace** Palettes... option from the Windows menu.
2. On the menu listing, click to the left of the name or names of the palettes you want to show or hide.

Note: This action is a toggle: clicking on an open (marked) palette closes it and Vice Versa.



3. Open palettes will appear checkmarked on the menu listing

DCAD VectorSpace palettes may be relocated or reshaped to your likes and needs

To move a DCAD VectorSpace Tool Palette: Click on its title bar and drag it wherever you wish



Figure 15.- DCAD VectorSpace Tool Palettes -Title bar

You may use the lower right corner of a **DCAD VectorSpace** tool palette to reshape to your liking and convenience.



Figure 16.- DCAD VectorSpace Tool Palettes - Reshape cursor

To reshape a DCAD VectorSpace Tool Palette

1. Click and hold the cursor on the lower left corner of the palette. A reshape cursor will appear.
2. Drag the cursor until the palette has the shape you desire and release the mouse button.

The palette will shrink tightly to contain the tool icons in the smaller possible area for the selected configuration.

Note: If necessary, move the palette to any desired location.



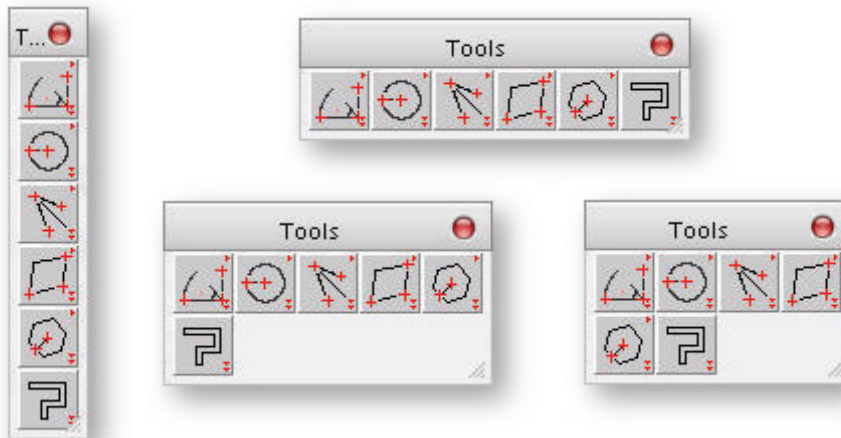


Figure 17.-DCAD VectorSpace Tool Palettes - Several shapes for a DCAD VectorSpace tool palette

Using the DCAD VectorSpace Tool Palettes

With some differences, the instruments housed in the **DCAD VectorSpace** VectorSpace tool palettes are used in the same form as those contained in the **DCAD VectorSpace** VectorSpace Tool Manager.

Note: Only those tools allowed in the active drawing mode (2D/3D) will be enabled in the palettes. All other tools will be disabled (greyed-out).

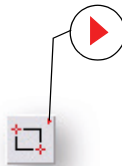


To use a DCAD VectorSpace tool from a palette

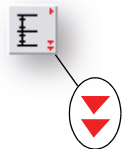
1. Click on the icon of the tool you want to use.
2. Follow the procedure for the selected tool, as described later in this same document (See **Basic Tool Sets**, page 13).

DCAD VectorSpace Parametric Tool Icons

A triangle in the top right corner of the tool icon indicates that a Menu Instruments will open up if the icon is pressed. The displayed bar groups similar Instruments. Drag along the open bar and click on the desired tool. The last selected tool will be visible in the palette.



An icon with double triangle in the bottom-right corner offers access to the tool's Parameter Dialog. To open this dialog, double Click on the icon.



To select a tool from the icon menu

1. Click and hold the mouse button on the icon.
A graphic menu opens from this icon

Basic Tool Sets

DCAD VectorSpace Basic Tool Sets

Note: The tool sets listed here are those installed by DCAD VectorSpace vers. 3, shipping on the date of this document. These may be modified, substituted or deleted in further versions of the software.



Arcs Tools

Holds tools and toolsets related to the construction of Arcs objects.



Circles Tools

Holds tools and toolsets related to the construction of Circles objects.



Lines Tools

Holds tools and toolsets related to the construction of Lines objects.



Polygons

Holds tools and toolsets related to the construction of Polygons objects.



Dimensioning & Text Tools

Holds tools and toolsets related to the construction of Dimensioning objects.



3D Solids Tools

Holds tools and toolsets related to the construction of 3D Solids objects.



3D Walls & Panels Tools

Holds tools and toolsets related to the construction of Walls objects.



Doors Tools

Holds tools and toolsets related to the construction of Doors objects.



Windows Tools

Holds tools and toolsets related to the construction of Windows objects.



Stairs Tools

Holds tools and toolsets related to the construction of Stairs objects.



Roof Tools

Holds tools and toolsets related to the construction of Roofs objects.

DCAD VectorSpace Basic Tool Sets (Continued)



Furniture - Office Furniture Tools

Holds tools and toolsets related to the construction of Furniture Tools objects.



DCAD VectorSpace Commands

Holds tools and toolsets related to DCAD VectorSpace Commands.



3D Modeling Commands

Holds tools and toolsets related to 3D Modeler Commands.



DCAD line Commands

Holds tools and toolsets related to DCAD line Commands.

Arcs Tools

Contains tools and/or toolsets related to the construction of Arcs Tools.



The following items are available in this toolset:

Arcs Tools



Bicubic Arc

This tool creates variable radius arcs by setting three points included in the arc.



Two Point Arc

This tool creates an arc by defining its endpoints and the direction of the arc.



Arc by Endpoint, Center and Angle

This tool creates an arc by defining an endpoint, the radius center and the included angle.



Arc by Endpoint, Center and Direction

This tool creates an arc by defining an endpoint, the radius center, the arc limit and the direction in which it will be drawn.



Inside Tangent Arc

This tool creates an arc tangent to two lines defined by the construction vectors. The arc will be drawn towards the vector's intersection point.



Outside Tangent Arc

This tool creates an arc tangent to two lines defined by the construction vectors. The arc will be drawn away from the vector's intersection point.

Bicubic Arc

This tool creates variable radius arcs by setting three points included in the arc.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct a Bicubic Arc

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder.
3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on the bicubic arc's starting point.
6. Click on another point on the bicubic arc.
7. Click on the bicubic arc's ending point.
8. The arc is drawn and selected.



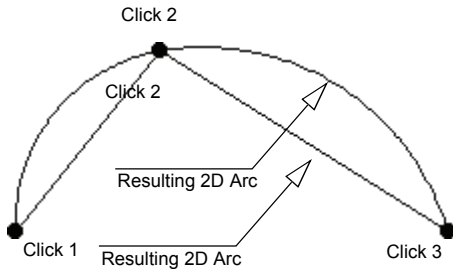


Figure 20.- Construction - Bicubic Arc

Bicubic Arc Parameters

Parameter	Type	Description
None		

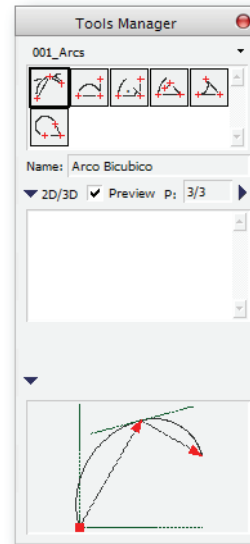


Figure 21.- Tool Manager - Bicubic Arc

Two Point Arc

This tool creates an arc by defining its end-points and the direction of the arc.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To Construct a Two Point Arc

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder.
3. Select (click) the tool's icon.
4. If the arc's chord is required check the Draw Chord option in the tool's parameter list (See **Two Point Arc Parameters**, page 16)



5. Select Insert in the right-hand menu in the tool manager.
6. Click on the arc's starting point.
7. Click on the arc's ending point.
8. Click in the general direction where you want the arc drawn.

Note: This third click need not be precise. A click to one side or the other of the arc's chord is enough.



9. The arc is drawn and selected

Two Point Arc Parameters

Parameter	Type	Description
Draw Chord	Boolean	Indicates whether the arc's chord should be drawn or not. - Yes/No

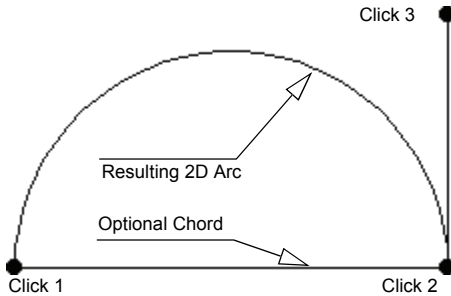


Figure 22.- Construction - Two Point Arc

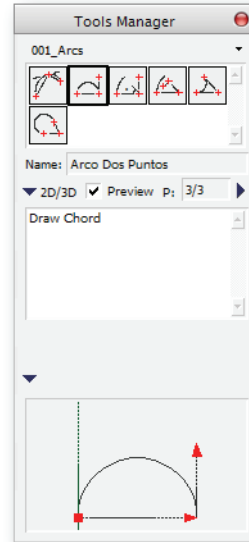


Figure 23.- Tool Manager - Two Point Arc

Arc by Endpoint, Center and Angle

This tool creates an arc by defining an endpoint, the radius center and the included angle.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct an Arc by Endpoint, Center and Angle

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder.
3. Select (click) the tool's icon.
4. Select the angle parameter and type in the value for the included angle (See



Arc by Endpoint, Center and Angle Parameters, page 17)

5. Select Insert in the right-hand menu in the tool manager.
6. Click on the arc's starting point.
7. Click on the arc's center.
8. Click in the general direction where you want the arc drawn.

Note: This third click need not be precise. A click to one side or the other of the arc's chord is enough.



9. The arc is drawn and selected

Arc by Endpoint, Center and Angle Parameters

Parameter	Type	Description
Angle	Text	Angle Included between the arc's endpoints - Decimal Degrees

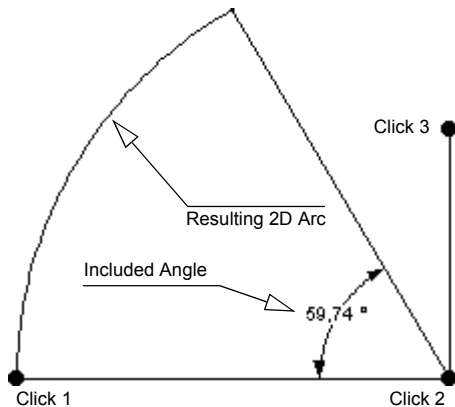


Figure 24.- Construction - Arc by Endpoint, Center and Angle

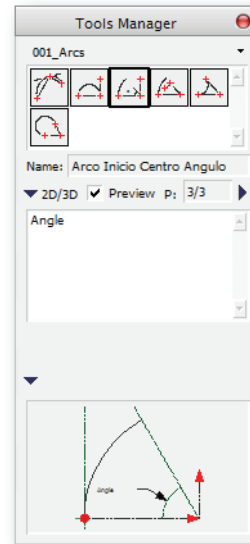


Figure 25.- Tool Manager - Arc by Endpoint, Center and Angle



Arc by Endpoint, Center and Direction

This tool creates an arc by defining an end-point, the radius center, the arc limit and the direction in which it will be drawn.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct an Arc by Endpoint, Center and Direction

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder. 
3. Select (click) the tool's icon. 
4. If the arc's chord is required check the Draw Chord option in the tool's parameter list (See **Arc by Endpoint, Center and Angle Parameters**, page 17)

5. Select Insert in the right-hand menu in the tool manager.
6. Click on the arc's starting point.
7. Click on the arc's Center.
8. Click to establish a vector that defines the arc's included angle
9. Click in the general direction where you want the arc drawn.

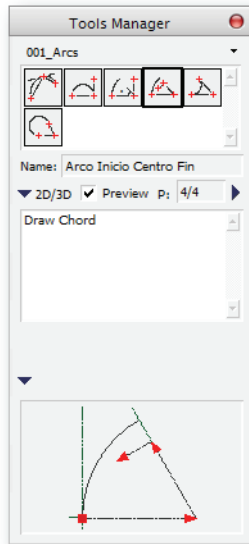
Note: This third click need not be precise. A click to one side or the other of the arc's included angle vector is enough.



10. The arc is drawn and selected

Arc by Endpoint, Center and Direction Parameters

Parameter	Type	Description
Draw Chord	Boolean	Indicates whether the arc's chord should be drawn or not. - Yes/No



Tool Manager - Arc by Endpoint, Center and Direction.

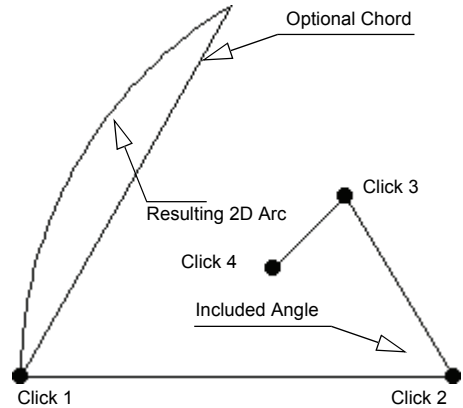


Figure 26.- Construction - Arc by Endpoint, Center and Direction

Inside Tangent Arc

This tool creates an arc tangent to two lines defined by the construction vectors. The arc will be drawn towards the vector's intersection point.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct an Inside Tangent Arc

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder.
3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on the arc's starting point.
6. Click to establish the first tangent vector.



7. Click to establish the second tangent vector.

8. The arc is drawn and selected

Inside Tangent Arc Parameters

Parameter	Type	Description
None		

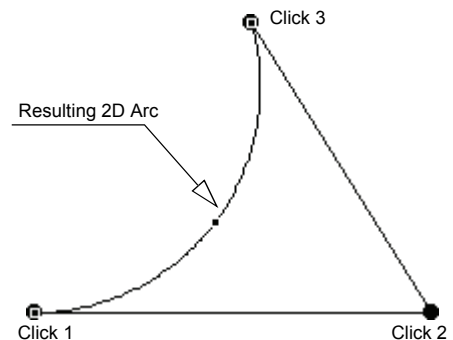


Figure 27.- Construction - Inside Tangent Arc

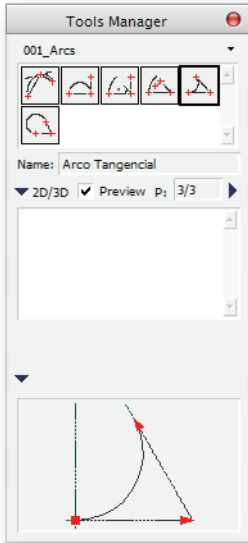


Figure 28.- Tool Manager - Inside Tangent Arc

Outside Tangent Arc

This tool creates an arc tangent to two lines defined by the construction vectors. The arc will be drawn away from the vector's intersection point.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct an Outside Tangent Arc

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Arcs tools folder.



3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on the arc's starting point.
6. Click to establish the first tangent vector.
7. Click to establish the second tangent vector.
8. The arc is drawn and selected



Outside Tangent Arc Parameters

Parameter	Type	Description
None		

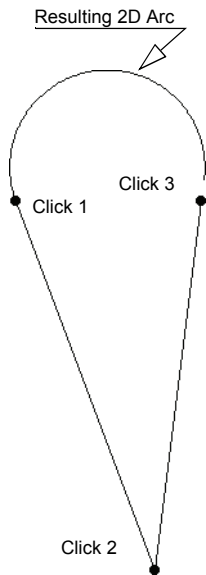


Figure 29.- Construction - Outside Tangent Arc

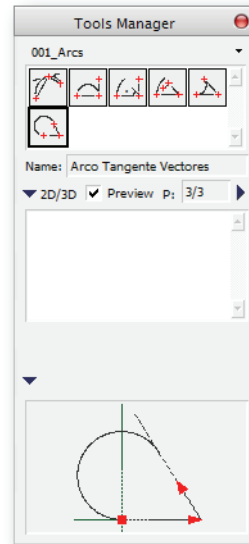


Figure 30.- Tool Manager - Outside Tangent Arc

Circles Tools

Holds tools and toolsets related to the construction of Circles objects.



The following items are available in this toolset:

Circles Tools



Circle Edge to Center

This tool creates circles by setting a point on the edge and then establishing their centers.



Circle Diameter

This tool creates circles by defining any diameter.



Circle Tangent to Vectors

This tool creates circles tangent to two intersecting vectors.

Circle Edge to Center

This tool creates circles by setting a point on the edge and then establishing their centers.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To construct a Circle Edge to Center

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Circles tools folder.



3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on a point on the circle's edge.
6. Click on the intended center of the circle.
7. The circle is drawn and selected



Circle Edge to Center Parameters

Parameter	Type	Description
None		

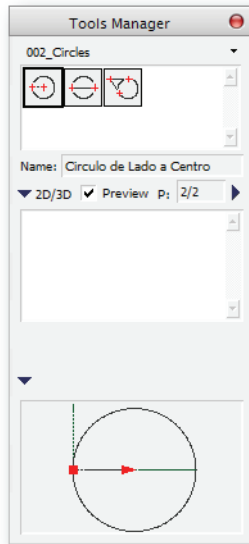


Figure 31.- Tool Manager - Circle Edge to Center

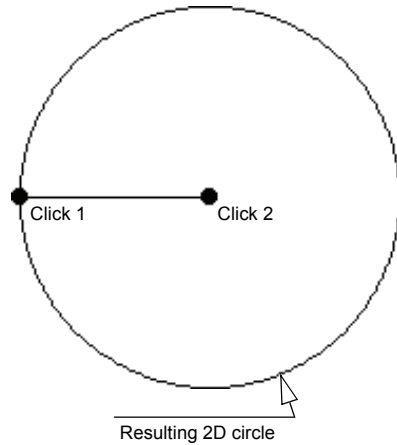


Figure 32.- Construction - Circle Edge to Center

Circle Diameter

This tool creates circles by defining any diameter.

Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To Construct a Circle Diameter

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Circles tools folder.



3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on a point on the circle's edge.
6. Click on the intended diameter end opposite the first point.
7. The circle is drawn and selected



Circle Diameter Parameters

Parameter	Type	Description
None		

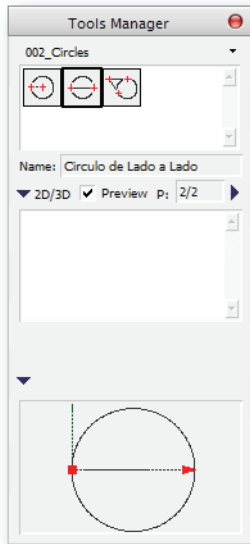


Figure 33.- Tool Manager - Circle Diameter

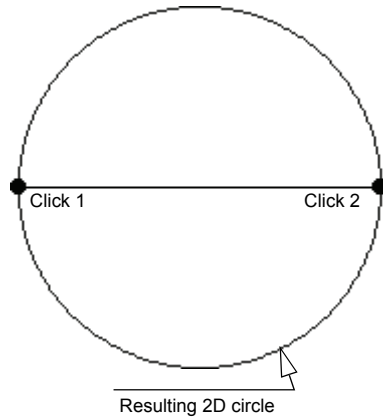


Figure 34.- Construction - Circle Diameter

Circle Tangent to Vectors

This tool creates circles tangent to two intersecting vectors.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To Construct a Circle Tangent to Vectors

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Circles tools folder.



3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.
5. Click on a point on the circle's edge.
6. Click to define the first tangent vector.
7. Click to define the second tangent vector.
8. The circle is drawn and selected



Circle Tangent to Vectors Parameters

Parameter	Type	Description
None		

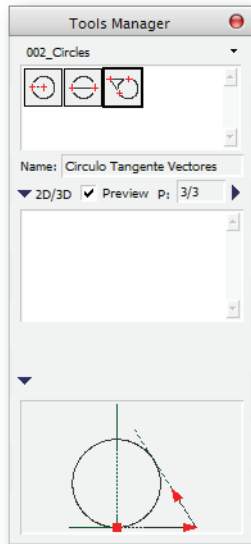


Figure 35.- Tool Manager - Circle Tangent to Vectors

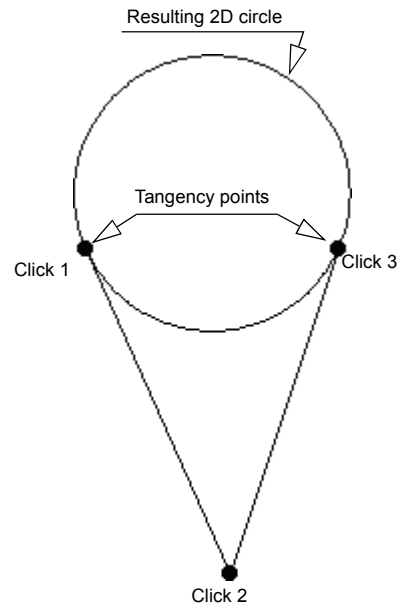


Figure 36.- Construction - Circle Tangent to Vectors

Lines Tools

Holds tools and toolsets related to the construction of Lines objects.



The following items are available in this toolset:

Lines Tools



Linked Line

This tool constructs Lines linked to data from other objects in the drawing.



Free Line

This tool constructs Free Lines linked to data from other objects in the drawing.



Bisecting Line

This tool constructs Bisecting Lines between two intersecting vectors.



Center-End Line

This tool constructs a line by defining the line segment's centerpoint and one of the end points.

Linked Line

This tool constructs Lines linked to properties from other objects in the drawing.



Number of construction points: 1
Number of Construction Vectors: None
Mode: 2D Drawing/3D Modeling

To construct a Linked Line

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Lines tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Linked Line Parameters**, page 26)



5. Select Insert in the right-hand menu in the tool manager.
6. Click on the desired point.
7. The line appears drawn and selected.

Linked Line Parameters

Parameter	Type	Description
Line Length	Free	Length of the drawn line - Current linear units
Line Angle	Menu	Line angle with respect to the X axis
Line Angle	Free	Line angle with respect to the X axis - Current Angular Units
Line Offset	Free	Offset of line from clicked point - Current Linear units
Line tool options	Menu	

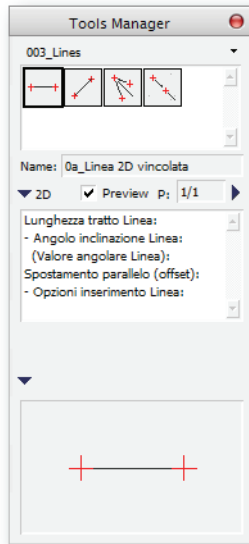


Figure 37.- Tool Manager - Linked Line

Free Line

This tool constructs free Lines following several simple rules.

Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To construct a Free Line

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Lines tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Free Line Parameters**, page 27)



5. Select Insert in the right-hand menu in the tool manager.
6. Clic on the first desired point.
7. Clic on the second desired point.
8. The line appears drawn and selected.

Free Line Parameters

Parameter	Type	Description
Line Length	Free	Length of the drawn line - Current linear units
Line Offset	Free	Offset of line from clicked point - Current Linear units
Line tool options	Menu	

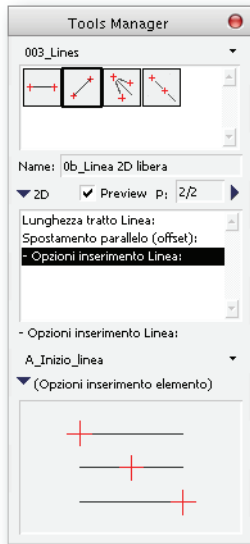


Figure 38.- Tool Manager -Free Line



Bisecting Line

This tool constructs Bisecting Lines between two intersecting vectors.




Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct a Bisecting Line

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Lines tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Bisecting Line Parameters**, page 28)

5. Select Insert in the right-hand menu in the tool manager.
6. Clic on one of the intersecting lines.
7. Clic on the intersection of both lines.

Note: If the two lines do not physically intersect, use the snaps menu to establish the intersection. 

8. Clic on the second intersecting line.
9. The line appears drawn and selected.

Bisecting Line Parameters

Parameter	Type	Description
Line Length	Free	Length of the drawn line - Current linear units

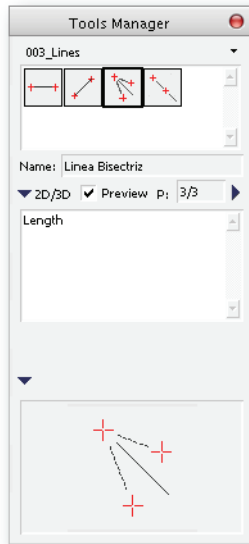


Figure 39.- Tool Manager - Bisecting Line

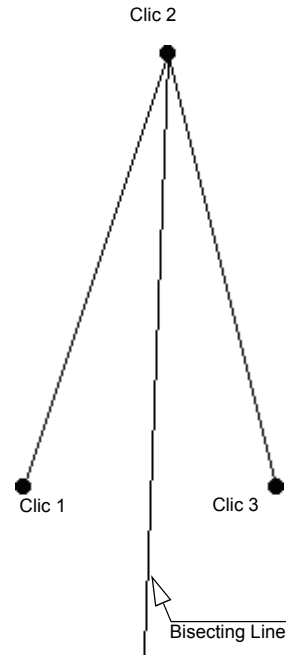


Figure 40.- Construction - Bisecting Line

Center-End Line

This tool constructs a line by defining the line segment's centerpoint and one of the end points.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To construct a Center-End Line

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Lines tools folder.
3. Select (click) the tool's icon.
4. Select Insert in the right-hand menu in the tool manager.



5. Click on the intended centerpoint for the line.
6. Click on one of the lines endpoints.
7. The line appears drawn and selected.

Center-End Line Parameters

Parameter	Type	Description
None		

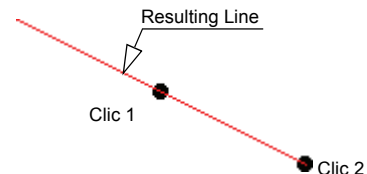


Figure 41.- Construction - Center-End Line

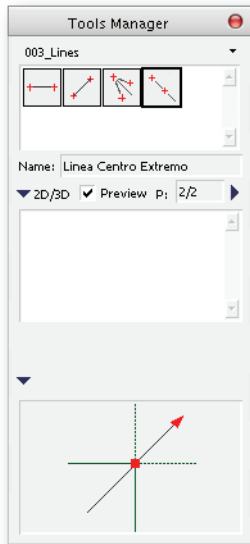


Figure 42.- Tool Manager - Center-End Line

Polygon Tools

Holds tools and toolsets related to the construction of Polygonal objects.



The following items are available in this toolset:

Polygon Tools



Parallelogram

This tool constructs Parallelograms by defining two adjoining sides.



Trapezoid

This tool constructs Trapezoids by defining two adjoining sides.



Side-Center Regular Polygon

This tool constructs Regular n-sided polygons by defining the centerpoint of one of the sides and the center of the polygon



Regular Polygon by Side

This tool constructs Regular n-sided polygons by defining one of its sides and the general location of its center.



Vertex to Center Regular Polygon

This tool constructs Regular n-sided polygons by defining one of its vertex and the center of the polygon

Parallelogram

This tool constructs Parallelograms by defining two adjoining sides.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct a Parallelogram

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Polygon tools folder.
3. Select (click) the tool's icon.



4. Select Insert in the right-hand menu in the tool manager.
5. Click on one of the parallelogram's vertex.
6. Click on the endpoint of the intended first side of the polygon.
7. Click on the endpoint of the intended second side of the polygon
8. The Parallelogram appears drawn and selected.

Parallelogram Parameters

Parameter	Type	Description
-----------	------	-------------

None		
------	--	--

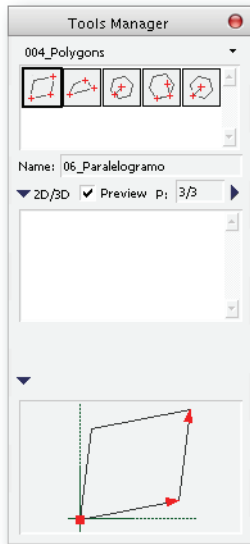


Figure 43.- Tool Manager - Parallelogram

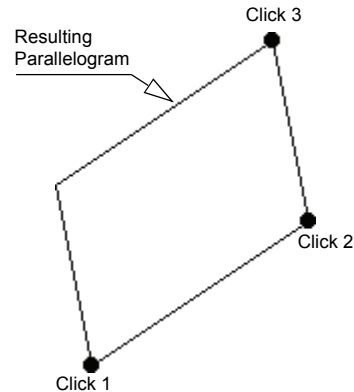


Figure 44.- Construction - Parallelogram

Trapezoid

This tool constructs Trapezoids by defining two adjoining sides.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct a Trapezoid

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Polygons tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Trapezoid Parameters**, page 32)



5. Select Insert in the right-hand menu in the tool manager.
6. Click on one of the Trapezoid's vertex.
7. Click on the endpoint of the intended first side of the polygon.
8. Click on the endpoint of the intended second side of the polygon
9. The Trapezoid appears drawn and selected.

Trapezoid Parameters

Parameter	Type	Description
Insert	Menu	Base/Side

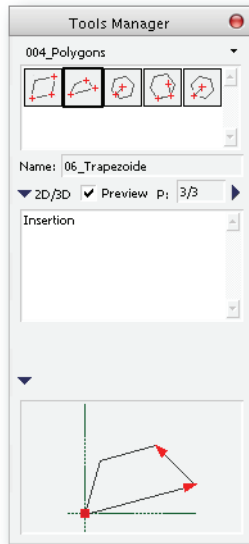


Figure 45.- Tool Manager - Trapezoid

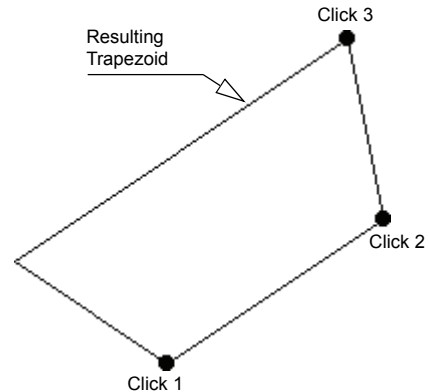


Figure 46.- Construction - Trapezoid

Side-Center Regular Polygon

This tool constructs Regular n-sided polygons by defining the centerpoint of one of the sides and the center of the polygon.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To construct a Side-Center Regular Polygon

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Polygon tools folder.
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Side-Center Regular Polygon Parameters**, page 33)
5. Select Insert in the right-hand menu in the tool manager.
6. Click on the centerpoint of one of the intended polygon sides.
7. Click on the centerpoint of the intended regular polygon.
8. The Polygon appears drawn and selected.

Side-Center Regular Polygon Parameters

Parameter	Type	Description
Number of sides	Free	Integer greater than 2

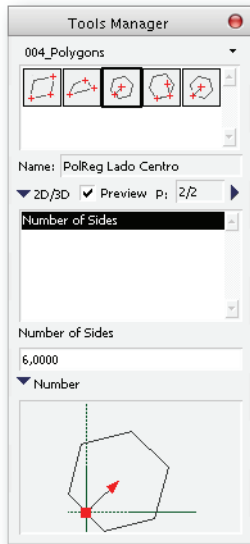


Figure 47.- Tool Manager - Side-Center Regular Polygon

Regular Polygon by Side

This tool constructs Regular n-sided polygons by defining one of its sides and the general location of its center.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing/3D Modeling

To construct a Regular Polygon by Side

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Polygons tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Regular Polygon by Side Parameters**, page 34)

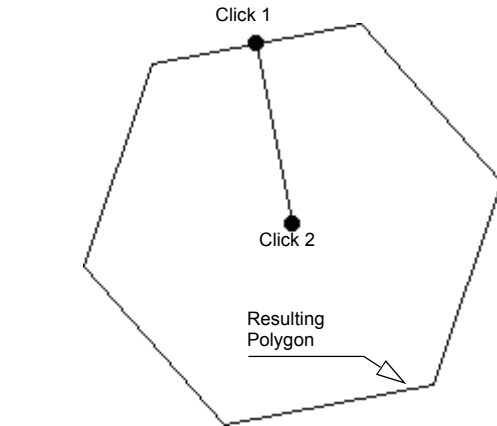


Figure 48.- Construction - Side-Center Regular Polygon

5. Select Insert in the right-hand menu in the tool manager.
6. Click on the endpoint of one of the intended polygon sides.
7. Click on the other end of the intended polygon side.
8. Click to either side of the first vector to establish the general direction of the polygon construction.

Note: This third click need not be precise. A click to one side or the other of the polygon's side is enough.



9. The Polygon appears drawn and selected.

Regular Polygon by Side Parameters

Parameter	Type	Description
Number of sides	Free	Integer greater than 2

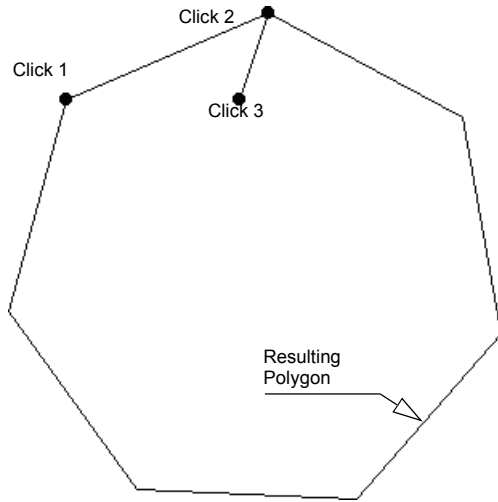


Figure 49.- Construction - Regular Polygon by Side

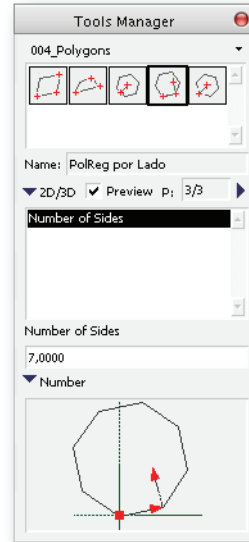


Figure 50.- Tool Manager - Regular Polygon by Side

Vertex to Center Regular Polygon

This tool constructs Regular n-sided polygons by defining one of its vertex and the center of the polygon.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing/3D Modeling

To construct a Vertex to Center Regular Polygon

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Polygon tools folder.
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Vertex to Center Regular Polygon Parameters**, page 35)
5. Select Insert in the right-hand menu in the tool manager.
6. Click on one of the vertex the intended polygon sides.
7. Click on the centerpoint of the intended regular polygon.
8. The Polygon appears drawn and selected.

Vertex to Center Regular Polygon Parameters

Parameter	Type	Description
Number of sides	Free	Integer greater than 2

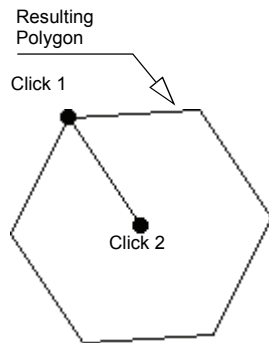


Figure 51.- Construction - Vertex to Center Regular Polygon

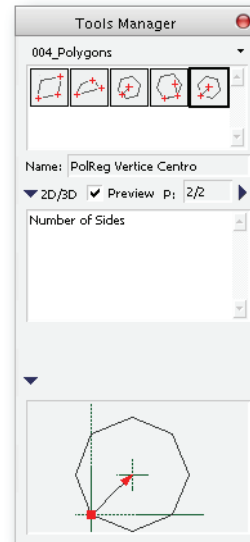


Figure 52.- Tool Manager - Vertex to Center Regular Polygon

Dimensioning & Text Tools

Holds tools and toolsets related to the addition of Dimensional data to existing objects in the drawing.



The following items are available in this toolset:

Dimensioning & Text Tools



Dimensioning Text

This tool adds length and, optionally, angle value text (in current units) to an existing line segment.



2D Multi-Level Dimension

This tool creates progressive multi-level 2D dimension objects. It also adds custom decorative markers and witnesses.



2D Door/Window Dimension

This tool creates 2D dimension objects of doors and windows

Dimensioning Text

This tool adds length and, optionally, angle values (in current units) text to an existing line segment.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Drawing

Note: This tool **DOES NOT** create other dimensioning artifacts such as witness lines or dimension markers.



5. Select Insert in the right-hand menu in the tool manager.
6. Click on one of the endpoints of the line segment to be dimensioned.
7. Click on the opposite endpoint of the line segment.
8. The added text appears drawn and selected alongside the line segment.

To Add Dimensioning Text to a Line Segment

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Dimensioning tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Dimensioning Text Parameters**, page 37)



Dimensioning Text Parameters

Parameter	Type	Description
Number of decimals	Menu	Integer - 0 to 16
Font Size	Menu	Depends on output scale - 1 to 36
Text Position	Menu	Relative to Line Segment - Left/Center/Right.
Add Angle Text?	Boolean	Angle is measured with respect to the X-Axis - decimal degrees.

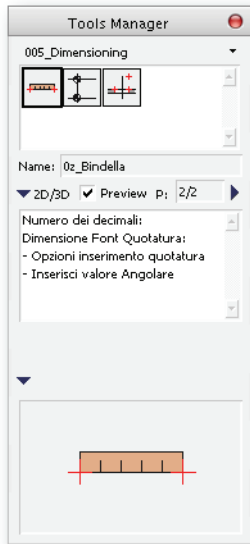


Figure 53.- Tool Manager - Dimensioning Text

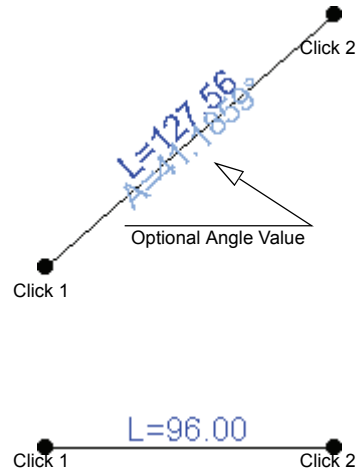


Figure 54.- Construction - Dimensioning Text

2D Multi-Level Dimension

This tool creates progressive multi-level 2D dimension objects. It also adds custom decorative markers and witnesses.



Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode: 2D Drawing

To construct a 2D Multi-Level Dimension:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Dimensioning tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **2D Multi-Level Dimension Parameters**, page 38)



5. Select Insert in the right-hand menu in the tool manager.
6. Use an elevation of your project as an underlay to draw, from the bottom up, a polygonal line whose construction points represent the levels that have to be dimensioned.

Note: Use cursor snaps to define these points with top precision.



7. Complete the procedure with a double click.
8. The dimension appears drawn and selected.

2D Multi-Level Dimension Parameters

Parameter	Type	Description
Number of Decimals	Menu	
Font Size	Menu	
Base Dimension Value	Free	Current Units
Marker options	Menu	

2D Multi-Level Dimension Parameters

Parameter	Type	Description
Dimension Line Options	Menu	
Witness Line direction	Menu	
Witness Line Length	Free	Current units
Dimension Line Offset	Free	Current units

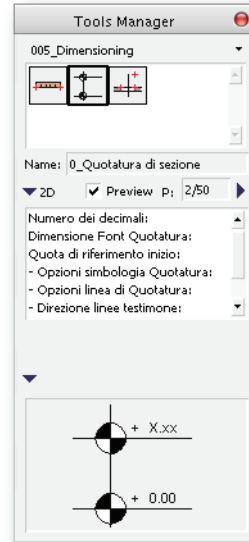


Figure 55.- Tool Manager - 2D Multi-Level Dimension

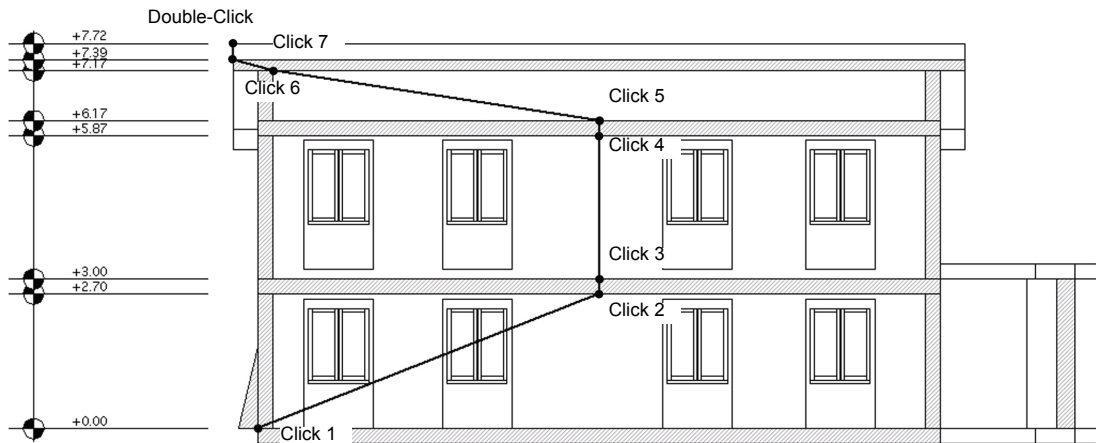


Figure 56.- Construction - 2D Multi-Level Dimension.

2D Door/Window Dimension

This tool creates 2D dimension objects of doors and windows.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Drawing

To construct a 2D Door/Window Dimension:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Dimensioning tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **2D Door/Window Dimension Parameters**, page 40)
5. Select Insert in the right-hand menu in the tool manager.
6. In Plan view, create a first vector with the width of the door or window.
7. Click on a third point to one side or the other of the wall.



Note: This click need not be precise. It only indicates whether the dimension shall be draw to one side of the wall or the other.



8. The dimension appears drawn and selected.

2D Door/Window Dimension Parameters

Parameter	Type	Description
Construction Options	Menu	
Insertion Point	Menu	
Dimension Type	Menu	Current Units
Draw Open/Closed	Menu	
Wall Thickness	Free	Current Units
Number of decimals	Menu	Yes/No
Fonts Size	Menu	Current units
Use Vector for dimension	Boolean	Yes/No

2D Door/Window Dimension Parameters

Parameter	Type	Description
Object width	Free	Current Units
Object Height	Free	Current Units

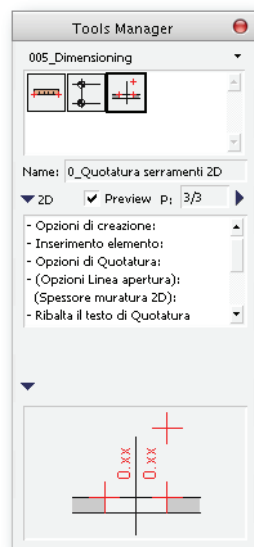


Figure 57.- Tool Manager - 2D Door/Window Dimension

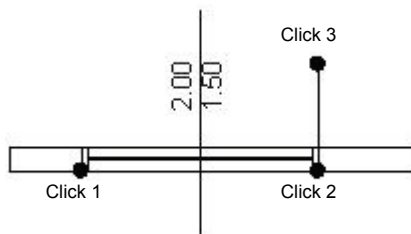


Figure 58.- Construction - 2D Door/Window Dimension

3D Solids Tools

Holds tools and toolsets related to the construction of 3D Solids in existing drawings.



The following items are available in this toolset:

3D Solids Tools

	3D C-Section Beam	This tool constructs 3D C-Section beams. Useful in metallic construction applications.
	3D L-Section Beam	This tool constructs 3D L-Section beams. Useful in metallic construction applications.
	3D T-Section Beam	This tool constructs 3D T-Section beams. Useful in metallic construction applications.
	3D Z-Section Beam	This tool constructs 3D Z-Section beams. Useful in metallic construction applications.
	3D H-Section Beam	This tool constructs 3D H-Section beams. Useful in metallic construction applications.
	3D Cylinder	This tool constructs circular or elliptical base cylinders.
	3D Cone	This tool constructs circular or elliptical base Cones.
	3D Pyramid	This tool constructs square or rectangular base pyramids.
	3D Truncated Pyramid	This tool constructs square or rectangular base truncated pyramids.

3D C-Section Beam



This tool constructs 3D C-Section beams. Useful in metallic construction applica-



tions.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D C-Section Beam:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D C-Section Beam Parameters**, page 43)
5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Beam appears drawn and selected.

3D C-Section Beam Parameters

Parameter	Type	Description
Construction options	Menu	
Beam Height	Free	Current Units
Beam Width	Free	Current Units
Beam Wall Thickness	Free	Current Units
Beam Length	Free	Current Units
Beam Base Height	Free	Current Units



Figure 59.- 3D C-Section Beam

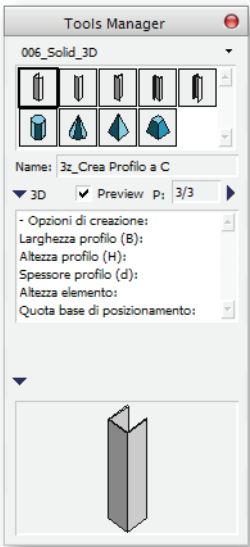


Figure 60.- Tool Manager - 3D C-Section Beam


3D L-Section Beam


This tool constructs 3D L-Section beams. Useful in metallic construction applications.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D L-Section Beam

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder. 

3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D L-Section Beam Parameters**, page 43)
5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Beam appears drawn and selected.

3D L-Section Beam Parameters

Parameter	Type	Description
Construction options	Menu	
Beam Height	Free	Current Units

3D L-Section Beam Parameters (Continued)

Parameter	Type	Description
Beam Width	Free	Current Units
Beam Wall Thickness	Free	Current Units
Beam Length	Free	Current Units
Beam Base Height	Free	Current Units



Figure 61.-3D L-Section Beam

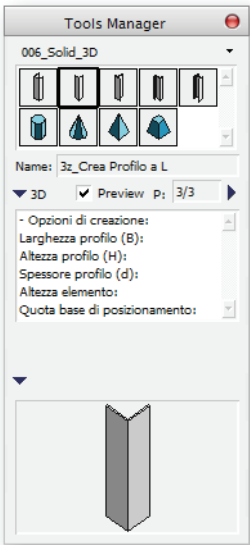


Figure 62.- Tool Manager - 3D L-Section Beam

3D T-Section Beam

This tool constructs 3D T-Section beams. Useful in metallic construction applications.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D T-Section Beam

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D T-Section Beam Parameters**, page 44)



5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Beam appears drawn and selected.

3D T-Section Beam Parameters

Parameter	Type	Description
Construction options	Menu	
Beam Height	Free	Current Units
Beam Width	Free	Current Units
Beam Wall Thickness	Free	Current Units
Beam Length	Free	Current Units
Beam Base Height	Free	Current Units



Figure 63.- 3D T-Section Beam

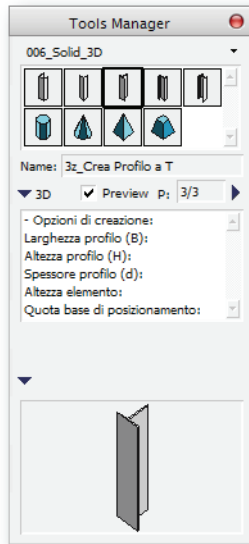


Figure 64.- Tool Manager - 3D T-Section Beam



3D Z-Section Beam

This tool constructs 3D Z-Section beams. Useful in metallic construction applications.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D Z-Section Beam

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D Z-Section Beam Parameters**, page 45)

5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Beam appears drawn and selected.

3D Z-Section Beam Parameters

Parameter	Type	Description
Construction options	Menu	
Beam Height	Free	Current Units
Beam Width	Free	Current Units
Beam Wall Thickness	Free	Current Units
Beam Length	Free	Current Units
Beam Base Height	Free	Current Units



Figure 65.- 3D Z-Section Beam

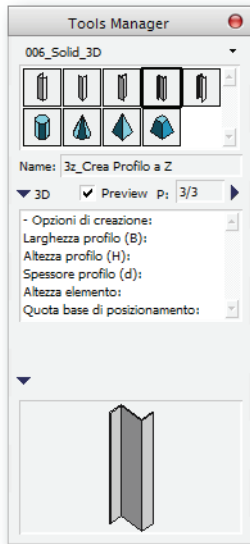


Figure 66.- Tool Manager - 3D Z-Section Beam



3D H-Section Beam

This tool constructs 3D H-Section beams. Useful in metallic construction applications.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D H-Section Beam:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D H-Section Beam Parameters**, page 46)

5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Beam appears drawn and selected.

3D H-Section Beam Parameters

Parameter	Type	Description
Construction options	Menu	
Beam Height	Free	Current Units
Beam Width	Free	Current Units
Beam Wall Thickness	Free	Current Units
Beam Length	Free	Current Units
Beam Base Height	Free	Current Units



Figure 67.- 3D H-Section Beam

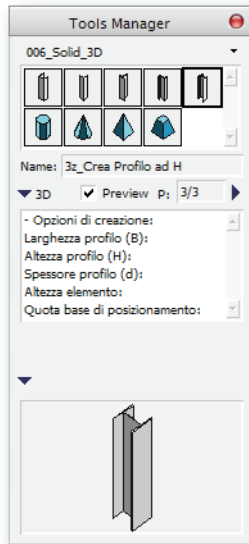


Figure 68.- Tool Manager - 3D H-Section Beam

3D Cylinder

This tool constructs circular or elliptical base cylinders.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D Cylinder:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Cylinder Parameters**, page 47)



5. Select Insert in the right-hand menu in the tool manager.

6. Create the two construction vectors

Note: If the **Use Vector** option is deselected:
 The vectors will determine the rotation of
 the cylinder's base



7. The Cylinder appears drawn and selected.

3D Cylinder Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Cylinder Length	Free	Current Units
Cylinder Width	Free	Current Units
Cylinder Height	Free	Current Units
Number of Cylinder Sides	Free	Integer greater than 2
Cylinder Base Height	Free	Current Units

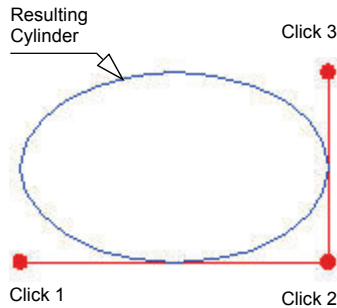


Figure 69.- Construction - 3D Cylinder



Figure 71.- 3D Cylinder - Elliptical base - Render View

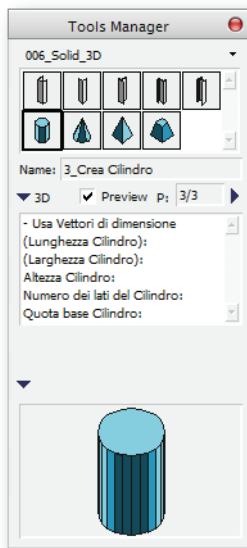


Figure 70.- Tool Manager - 3D Cylinder

3D Cone

This tool constructs circular or elliptical base cones.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model



To construct a 3D Cone:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Cone Parameters**, page 49)
5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors

Note: If the **Use Vector** option is deselected:
The vectors will determine the rotation of the cone's base

7. The Cone appears drawn and selected.

3D Cone Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Cone Length	Free	Current Units
Cone Width	Free	Current Units
Cone Height	Free	Current Units
Cone Base Height	Free	Current Units

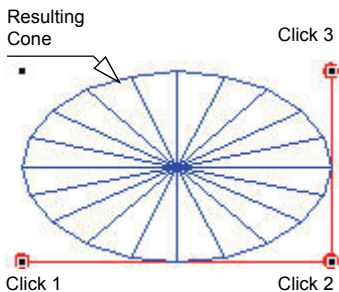


Figure 72.- Construction - 3D Cone

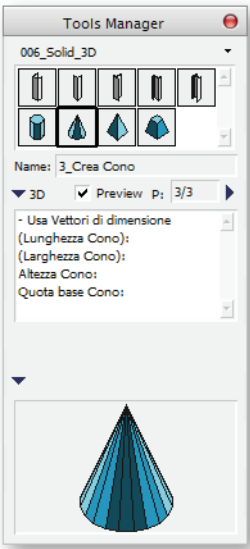


Figure 73.- Tool Manager - 3D Cone



Figure 74.- 3D Cone - Elliptical base - Render View

3D Pyramid

This tool constructs square or rectangular base pyramids.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct a 3D Pyramid:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Pyramid Parameters**, page 50)
5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors

Note: If the **Use Vector** option is deselected:
The vectors will determine the rotation of the Pyramid's base

7. The Pyramid appears drawn and selected.

3D Pyramid Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Pyramid Length	Free	Current Units
Pyramid Width	Free	Current Units
Pyramid Height	Free	Current Units
Pyramid Base Height	Free	Current Units

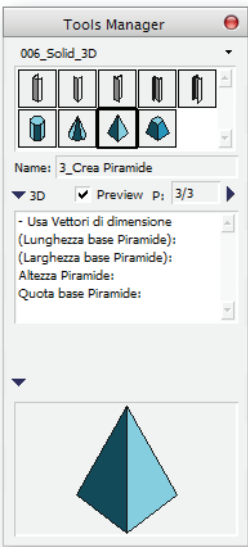


Figure 75.- Tool Manager - 3D Pyramid

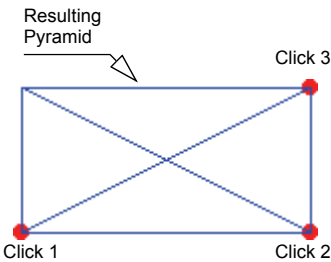


Figure 76.- Construction - 3D Pyramid

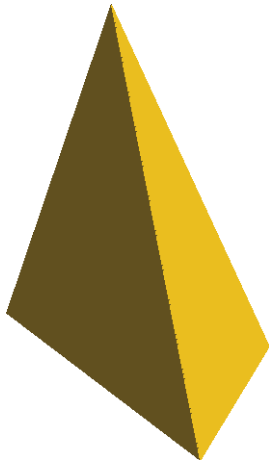


Figure 77.- 3D Pyramid

3D Truncated Pyramid

This tool constructs square or rectangular base truncated pyramids.



Number of construction points: 3
 Number of Construction Vectors: 2
 Mode: 3D Model

To construct a 3D Truncated Pyramid:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Solids tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Truncated Pyramid Parameters**, page 51)
5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors



Note: If the **Use Vector** option is deselected:
 The vectors will determine the rotation of
 the Pyramid's base



7. The Pyramid appears drawn and selected.

3D Truncated Pyramid Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Pyramid Length	Free	Current Units
Pyramid Width	Free	Current Units
Pyramid Height	Free	Current Units
Pyramid Base Height	Free	Current Units

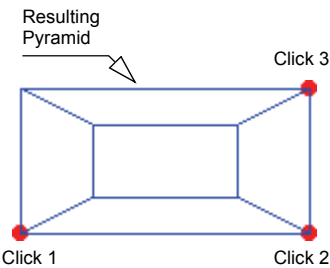


Figure 78.- Construction - 3D Truncated Pyramid

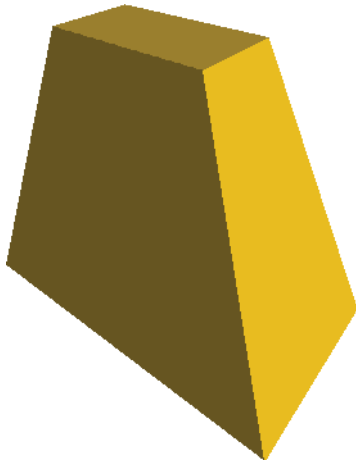


Figure 79.- 3D Truncated Pyramid

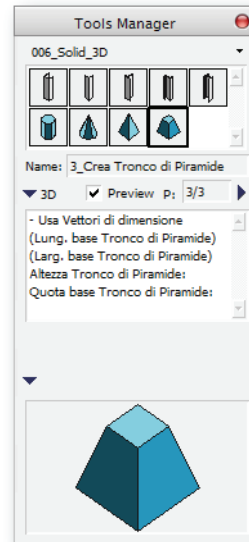


Figure 80.- Tool Manager - 3D Truncated Pyramid

3D Walls & Panels Tools

Holds tools and toolsets related to the construction of Walls in existing drawings.



The following items are available in this toolset:

3D Walls & Panels Tools



Cut 3D Object

This tool executes boolean cut operations on 3D objects

Note: This tool is fully documented in [DCAD VectorSpace Commands](#), page 153.



Extrude 2D Shapes

This tool extrudes a selected 2D object following established parameters



Composite Extrusion

This tool constructs complete extrusions of 2D shapes. The resulting objects include floors, walls and roofs.



3D Walled Corners

This tool constructs 3D walled corners formed by two wall panels.



3D Semi-Circular Walls

This tool constructs 3D Semi-Circular walls.



3D U-Walls

This tool constructs rectangular 3D alcoves.



3D Walls

This tool constructs 3D wall spans along a vector defined in the drawing.



3D Rectangular Wall

This tool constructs 3D walled enclosures along a rectangular shape defined by two vectors in the drawing.



3D Curved Walls

This tool constructs curved walls (Circular or arc segment)



Polygonal 3D Wall

This tool constructs 3D wall spans along a polygonal series of vectors defined in the drawing.



2D Polygonal Cell

This tool constructs 2D polygonal cells ready to generate ground relief surfaces.

3D Walls & Panels Tools (Continued)



2D Shapes

This tool constructs rectangular and/or Elliptical-Circular 2D shapes.

Extrude 2D Shapes

This tool extrudes one or more existing and selected 2D objects following established parameters



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Drafting

Note: This is not a construction tool in a strict sense. It is however very helpful when several 2D shapes must be extruded into 2D in various stages of the drawing development.



To Extrude 2D Shapes:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Extrude 2D Shapes Parameters**, page 54)
5. Select one or more 2D objects to be extruded into 3D
6. Select Insert in the right-hand menu in the tool manager.
7. The Objects will be extruded into 3D solids and appear selected in the 3D Model Mode.



Extrude 2D Shapes Parameters

Parameter	Type	Description
Extrusion Height	Free	Current Units
Extrusion Base Elevation	Free	Current Units

Extrude 2D Shapes Parameters (Continued)

Parameter	Type	Description
3D Plane Positioning	Boolean	Yes/No
When finished show..	Menu	2D/3D

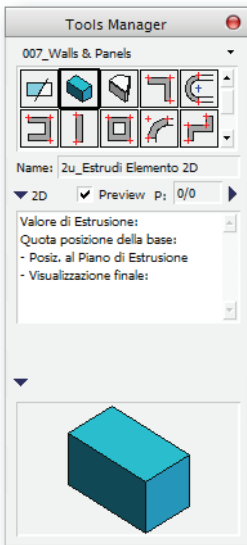


Figure 81.- Tool Manager - Extrude 2D Shapes

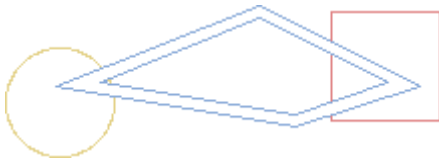


Figure 82.- Extrude 2D Shapes - Original 2D objects

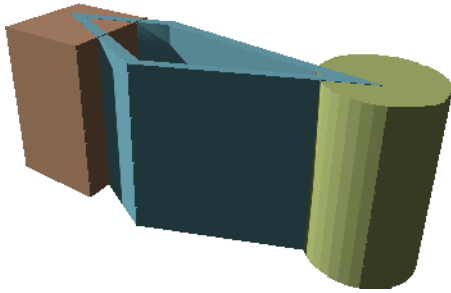


Figure 83.- Extrude 2D Shapes - Resulting 3D Solids - Render view

Composite Extrusion

Creates complete extrusions of 2D shapes. The resulting objects include floors, walls and roofs.



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Drafting

To Construct a Composite Extrusion

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Extrude 2D Shapes Parameters**, page 54)
5. Select one or more 2D objects to be extruded into 3D
6. Select Insert in the right-hand menu in the tool manager.
7. The Objects will be extruded into 3D solids and appear selected in the 3D Model Mode.



Composite Extrusion Parameters (Continued)

Parameter	Type	Description
Wall Offset Direction	Menu	
Number of selected objects	Free	Positive Integer
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units
Create Floor	Boolean	Yes/No
Floor Thickness ^c	Free	Current Units
Create Roof	Boolean	Yes/No
Roof Thickness ^d	Free	Current Units
When ready display...	Menu	2D/3D

- a. See Wall Types Constructed by Wall Tools, page 67
b. Active only if above parameter is set to "Custom"
c. Active only if "Create Floor" is checked
d. Active only if "Create Roof" is checked

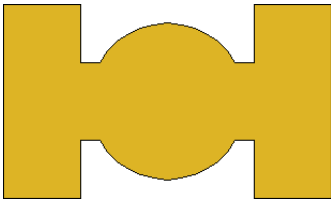


Figure 84.- Composite Extrusion - Original 2D objects

Composite Extrusion Parameters

Parameter	Type	Description
Wall Type ^a	Menu	

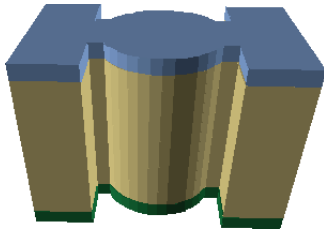


Figure 85.- Composite Extrusion - Resulting 3D Solids - Render view



Figure 86.- Composite Extrusion - Resulting 3D Solids - Render view. Top is moved to show wall construction.

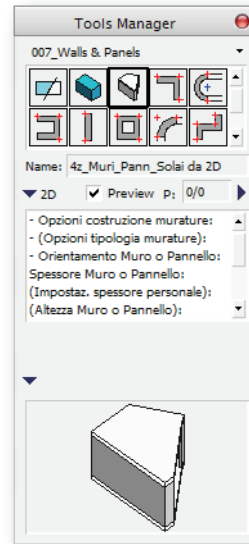


Figure 87.- Tool Manager - Composite Extrusion



3D Walled Corners

This tool constructs 3D walled corners formed by two wall panels.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct 3D Walled Corners:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D Walled Corners Parameters**, page 56)

5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Walls appear drawn and selected.

3D Walled Corners Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	Left/Right/Center
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

a. See *Wall Types Constructed by Wall Tools*, page 67

b. Active only if "custom" is set in "Wall Thickness" parameter

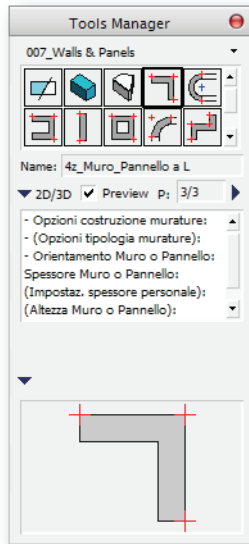


Figure 88.- Tool Manager - 3D Walled Corners

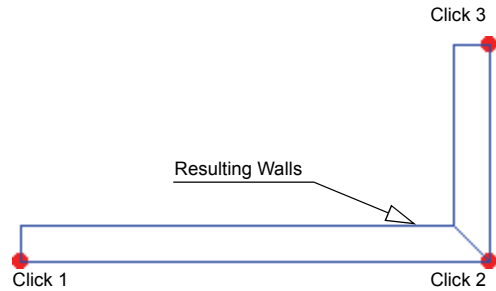


Figure 89.- Construction - 3D Walled Corners

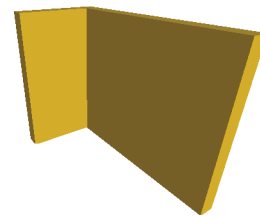


Figure 90.- Sample - 3D Walled Corners



3D Semi-Circular Walls

This tool constructs 3D Semi-Circular walls.




Number of construction points: 2
Number of Construction Vectors: 1
Mode: 3D Model

To construct 3D Semi-Circular Walls:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D Semi-Circular Walls Parameters**, page 57)
5. Select Insert in the right-hand menu in the tool manager.

6. Create the construction vector

Note: The construction vector establishes the endpoints of the semi-circular wall. The wall will be drawn to the left (according to the vector's direction) of the construction vector. 

7. The Wall appears drawn and selected.

3D Semi-Circular Walls Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	Left/Right/Center
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

^a See Wall Types Constructed by Wall Tools, page 67

^b Active only if "custom" is set in "Wall Thickness" parameter

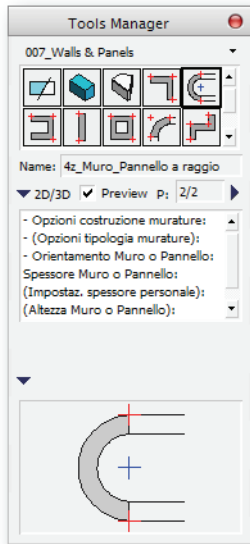


Figure 91.- Tool Manager - 3D Semi-Circular Walls

3D U-Walls

This tool constructs rectangular 3D alcoves.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct 3D U-Walls:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D U-Walls Parameters**, page 58)

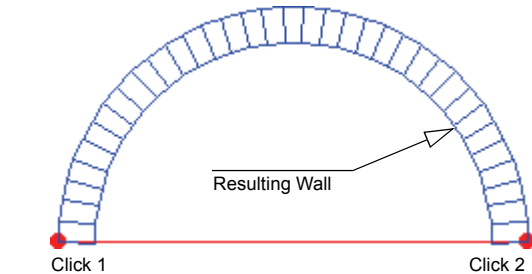


Figure 92.- Construction - 3D Semi-Circular Walls

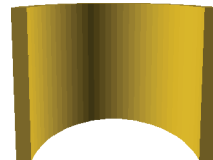


Figure 93.- Sample - 3D Semi-Circular Walls

5. Select Insert in the right-hand menu in the tool manager.
6. Create the construction vectors
7. The Wall appears drawn and selected.

3D U-Walls Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	Left/Right/Center
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

a. See *Wall Types Constructed by Wall Tools*, page 67

b. Active only if "custom" is set in "Wall Thickness" parameter

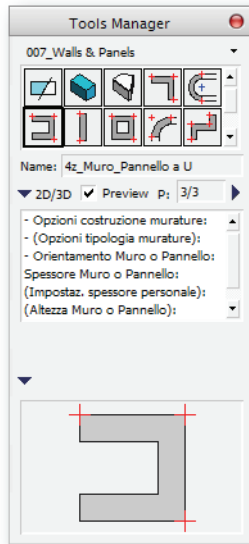


Figure 94.- Tool Manager - 3D U-Walls

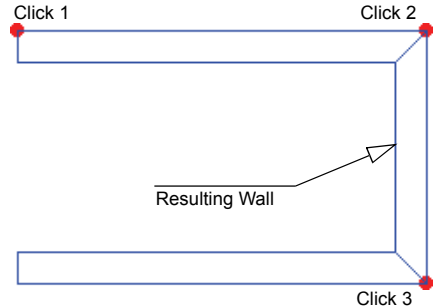


Figure 95.- Construction - 3D U-Walls

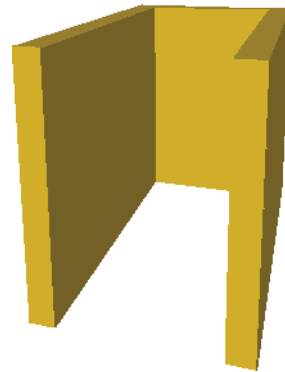


Figure 96.- Sample - 3D U-Walls

3D Walls

This tool creates 3D wall spans along a vector defined in the drawing.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 3D Modeling

To Construct 3D Walls Spans:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Walls Parameters**, page 60)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the vector that defines the required wall.



7. The Wall will appear selected in the 3D Model Mode.

3D Walls Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units
X Axis Offset	Free	Signed Current Units - X distance of wall from construction vector
Y Axis Offset	Free	Signed Current Units - Y distance of wall from construction vector

a. See Wall Types Constructed by Wall Tools, page 67
b. Active only if above parameter is set to "Custom"

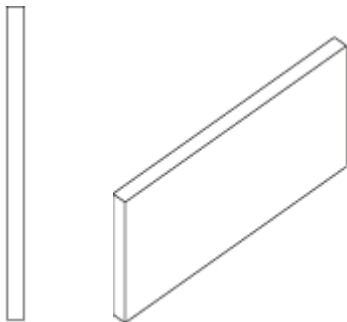


Figure 97.- 3D Walls - Samples

3D Rectangular Wall

This tool creates 3D walled enclosures along a rectangular shape defined by two vectors in the drawing.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Modeling

To Construct a 3D Rectangular Wall:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.

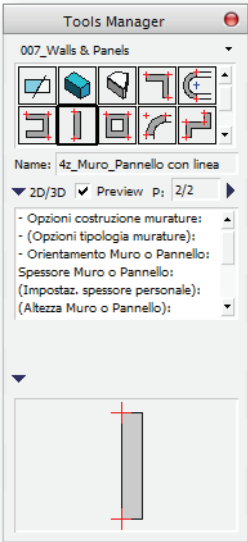


Figure 98.- Tool Manager - 3D Walls

3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Rectangular Wall Parameters**, page 61)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the two construction vectors that defines the required wall.
7. The Wall will appear selected in the 3D Model Mode.

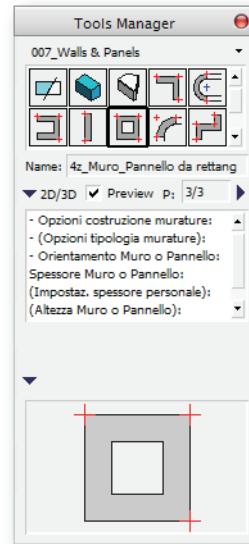


Figure 99.- Tool Manager - 3D Rectangular Wall

3D Rectangular Wall Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

a. See Wall Types Constructed by Wall Tools, page 67

b. Active only if above parameter is set to "Custom"



Figure 100.- 3D Rectangular Wall - Plan

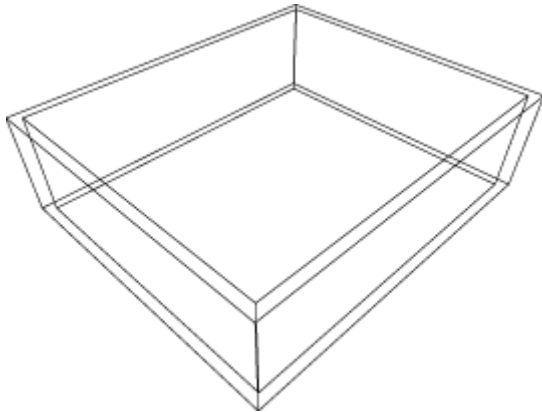


Figure 101.- 3D Rectangular Wall - Perspective

3D Curved Walls

This tool constructs curved walls (Circular or arc segment)



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To construct 3D Curved Walls:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Curved Walls Parameters**, page 62)



5. Select Insert in the right-hand menu in the tool manager.
6. Create the two construction vectors
7. The Wall appears drawn and selected.

3D Curved Walls Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	Left/Right/Center
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

a. See Wall Types Constructed by Wall Tools, page 67

b. Active only if "custom" s set in "Wall Thickness" parameter

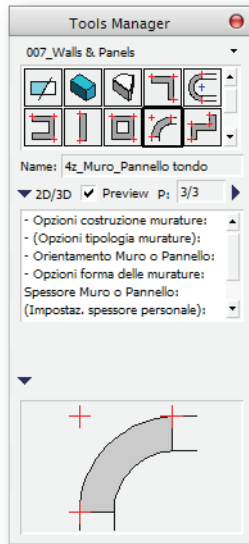


Figure 102.- Tool Manager - 3D Curved Walls

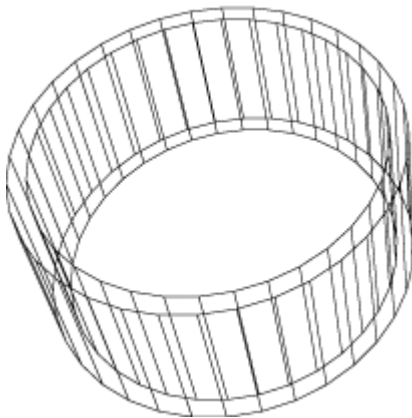


Figure 103.- 3D Curved Walls - Circular base

Polygonal 3D Wall

This tool creates 3D wall spans along a polygonal series of vectors defined in the



drawing.

Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode: 3D Modeling

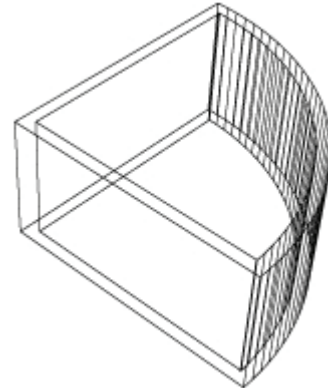


Figure 104.- 3D Curved Walls - Closed Arc-Segment base

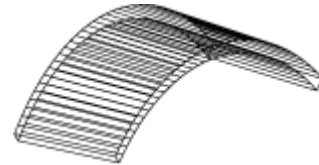




Figure 105.- 3D Curved Walls - Drawn on vertical view to represent a vaulted structure

To Construct a Polygonal 3D Wall:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Polygonal 3D Wall Parameters**, page 64)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the vector sequence that defines the required wall.
 - Close the last vector with a double click.
7. The Wall will appear selected in the 3D Model Mode.

Polygonal 3D Wall Parameters

Parameter	Type	Description
Wall Type ^a	Menu	
Wall Offset Direction	Menu	
Wall Thickness	Menu	Common Values + "Custom"
Wall Thickness (Custom) ^b	Free	Current Units
Wall Height	Free	Current Units
Wall Base Elevation	Free	Current Units

a. See Wall Types Constructed by Wall Tools, page 67
b. Active only if above parameter is set to "Custom"

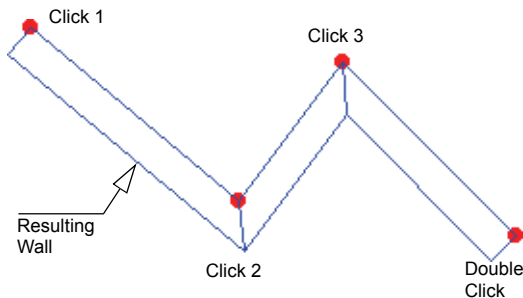


Figure 106.- Construction - Polygonal 3D Wall

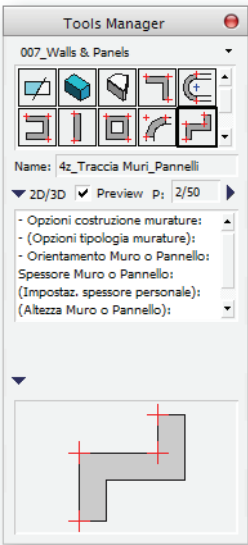


Figure 107.- Tool Manager - Polygonal 3D Wall

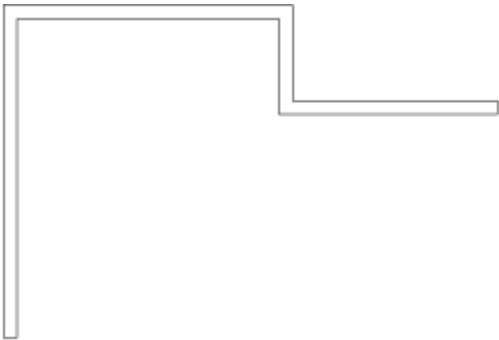


Figure 108.- Polygonal 3D Wall - Plan View

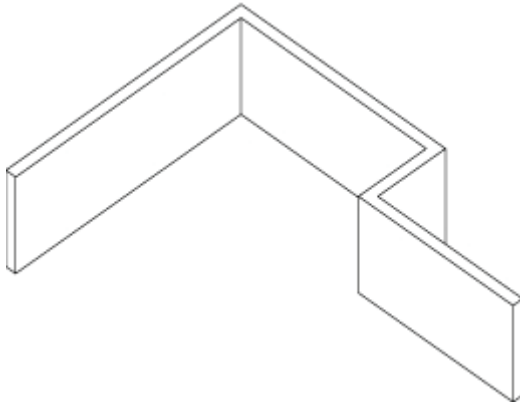


Figure 109.- Polygonal 3D Wall - Perspective

2D Polygonal Cell



This tool constructs 2D polygonal cells ready to generate ground relief surfaces.



The resulting cells will be triangles or rectangles.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft

To Construct a 2D Polygonal Cell:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **2D Polygonal Cell Parameters**, page 65)

5. Select Insert in the right-hand menu in the tool manager.

6. Draw the two construction vectors that define the required cell.

Note: The more 2D elements merged the more complex the resulting relief forms.



7. The cell will appear drawn and selected.

2D Polygonal Cell Parameters

Parameter	Type	Description
Relief option	Menu	
Side 1 Length	Free	Current Units
Side 2 Length	Free	Current Units
Diagonal Length	Free	Current Units
Side 3 Length	Free	Current Units
Side 4 Length	Free	Current Units

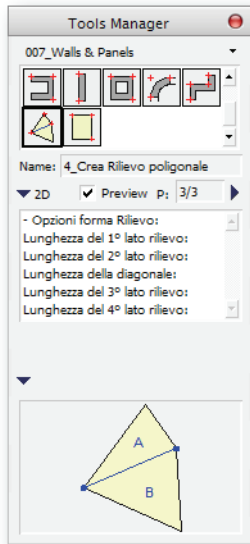


Figure 110.- Tool Manager - 2D Polygonal Cell

2D Shapes

This tool constructs rectangular and/or Elliptical-Circular 2D shapes...



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft

To construct 2D Shapes:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Walls & Panels Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **2D Shapes Parameters**, page 66)
5. Select Insert in the right-hand menu in the tool manager.



Figure 111.- 2D Polygonal Cell - Triangles.

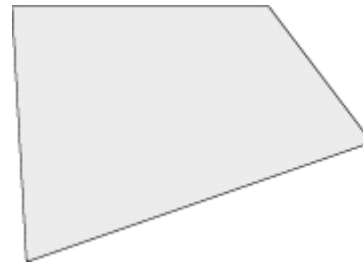


Figure 112.- 2D Polygonal Cell - Cuadrangle

6. Create the construction vectors

- The first click establishes the insertion point.
- The first vector establishes the objects orientation on the drawing window.
- The second vector indicates the direction for the shapes construction.

7. The Shape appears drawn and selected.

2D Shapes Parameters

Parameter	Type	Description
Object Shape	Menu	Rectangular/Circular
Object Length	Free	Current Units
Object Width	Free	Current Units
Insertion Offset ^a	Free	Signed Current Units

a. Measured in the direction of the first construction vector.

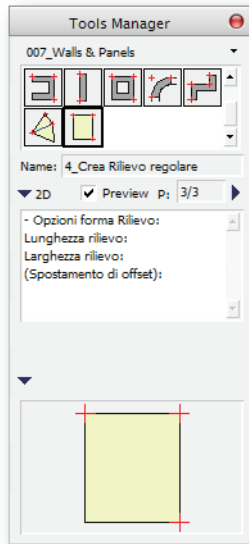


Figure 113.- Tool Manager - 2D Shapes

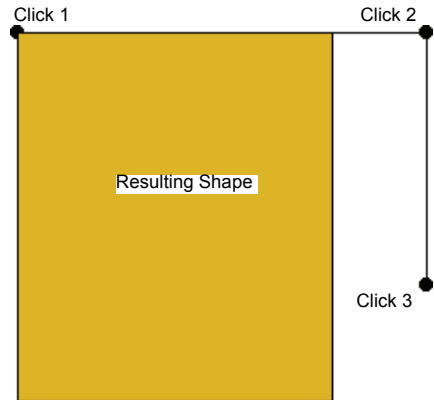


Figure 114.- Construction - 2D Shapes - Rectangle

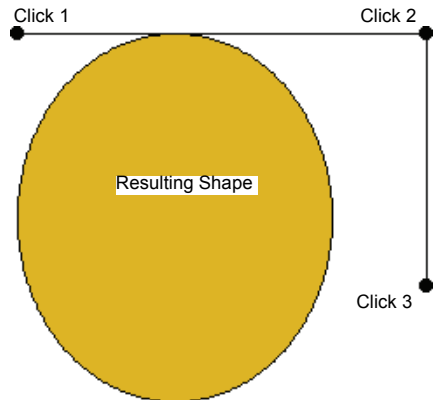


Figure 115.- Construction - 2D Shapes - Ellipse

Wall Types Constructed by Wall Tools

Some of the Wall construction tools have a parameter called Wall Type which usually allows two options: **Static Wall** and **Dynamic Wall**.

Different types of objects are created when any of these options are active.

Static Wall. This is a 3D solid modifiable as any other 3D object using the standard DCD tools.

The properties Manager will show the coordinates of each corner of the constructed wall.



Figure 116.- Static Wall

Dynamic Wall. These are 3D entities that can be modified directly from the Properties Manager or by the use of the Reshape Tool.

Note: The **Reshape** tool is available from the **Edit > Reshape** menu option or from the Action Buttons Bar

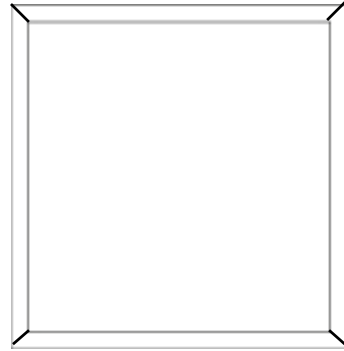


Figure 117.- Dynamic Wall

A Dynamic wall may be converted into a Static Wall when you polygonize it.



To do it, select the **Object > Path > Polygonize** menu option or activate from the Action Buttons Bar.

The same effect may be achieved using the **Object > Unchain** menu option.

Doors Tools

Holds tools and toolsets related to the construction of Doors in existing drawings.



The following items are available in this toolset:

Doors Tools



Door from Library

This tool inserts doors from predefined Libraries



Rectangular Door

This tool constructs rectangular doors of various sizes and materials.



Paneled Door

This tool constructs Paneled doors of various sizes and materials.



Glass Door

This tool constructs Glass doors of various sizes.



Solid Door

This tool constructs Solid doors of various sizes and materials.



Louvered Door

This tool constructs Grilled doors of various sizes and materials.

Door from Library

This tool inserts doors from predefined Libraries¹



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Draft / 3D Model

To Insert a Door from Library:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

1. The libraries contained in the "VL_Windows_Doors_frames_LIB.DVS" file are illustrated here. This may vary with your software.

2. If necessary, double click on the Doors Tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Door from Library Parameters**, page 70)



5. Select Insert in the right-hand menu in the tool manager.

6. The Selected Window will appear drawn at the origin, placed as a Library Item.

Door from Library Parameters

Parameter	Type	Description
Outside Doors	Menu	
Inside Door	Menu	
Swing Door	Menu	

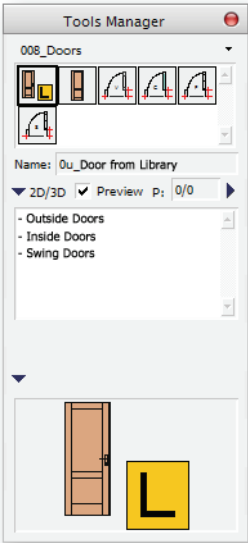


Figure 118.- Tool Manager - Door from Library

Rectangular Door

This tool constructs rectangular doors of various sizes and materials.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft / 3D Model

To Construct a Rectangular Door:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Doors Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Rectangular Door Parameters**, page 70)
5. Select Insert in the right-hand menu in the tool manager.



6. Draw the construction vector that defines the required door.
7. The Door will appear drawn and selected.

Rectangular Door Parameters

Parameter	Type	Description
Construction option	Menu	
Insertion Point	Menu	
Create Boolean Object...	Boolean	Yes/No
Add Dimension Object...	Boolean	Yes/No
Number of Dimension decimals ^a	Free	Positive Integer
Door Type	Menu	
Frame Type	Menu	
Door Inset	Free	Current Units
Wall Thickness	Free	Current Units
Jamb Thickness	Free	Current Units
Lockset Options	Menu	

Rectangular Door Parameters (Continued)

Parameter	Type	Description
Door Material	Menu	
Door Panel Material	Menu	
Door Width	Free	Current Units
Door Height	Free	Current Units
Door Thickness	Free	Current Units
Doorstep Elevation	Free	Current Units
Door is...	Menu	Left or Right-handed
2D Open Door Arc	Menu	None/45°/90°

a. Active only if "Add Dimension" is set to "Yes"



Figure 119.- Sample - Pocket Door - Rectangular Door

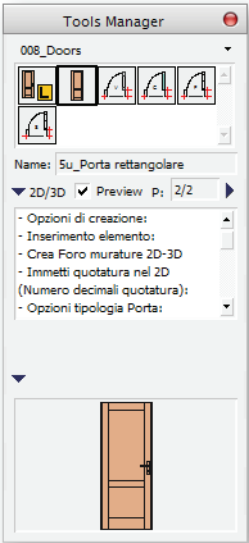


Figure 120.- Tool Manager - Rectangular Door



Figure 121.- Samples - Rectangular Door

Paneled, Glass, Solid and Louvered Doors

These tools construct doors of vari-





ous types, sizes and materials.

All these tools share a common use procedure, except for some of the parameter values or settings. Special cases will be discussed somewhere else.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft / 3D Model

To Construct a Door

1. Select the mode (Draft/Sculpt) to construct the door.
2. If the Tool Manager is not visible, select **Windows > Tool Manager**.
3. If necessary, double click on the Doors Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Paneled Door Parameters**, page 73, See **Glass Door Parameters**, page 73, See **Solid Door Parameters**, page 74 or See **Louvered Door Parameters**, page 74). Proceed as follows:
 - Select the parameter to modify.
 - Modify the parameter value as needed, and...
 - Repeat for each parameter that needs to be modified.
6. Select Insert in the right-hand menu in the tool manager.
7. Click on a point on one of the wall sides.

Note: This click sets the Lock side of the door. 

8. Move to the hinge side of the door and click again.

9. Set a third point to set the Jamb width and the direction the door will open

Note: If the Use Vector Parameter is active (Checked) this click should be located precisely 

10. The Door will appear drawn and selected.

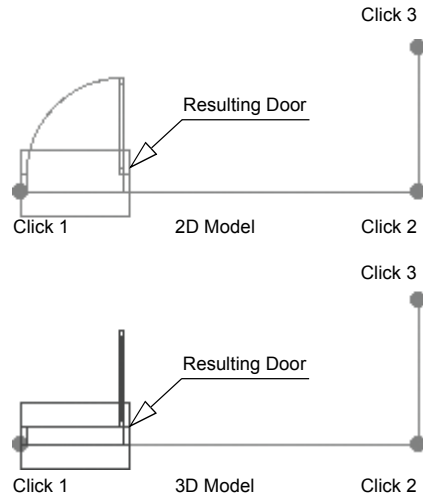


Figure 122.- Construction - Paneled, Glass, Solid and Louvered Doors

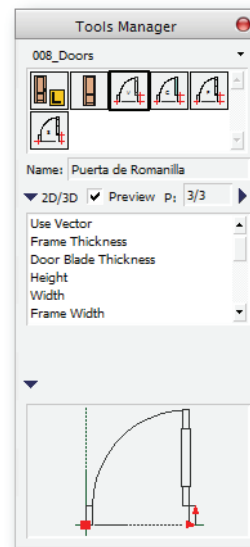


Figure 123.- Tool Manager - Paneled, Glass, Solid and Louvered Doors

Paneled Door Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Frame Thickness	Menu	
Frame Width	Menu	
Door Thickness	Menu	
Height	Free	
Width	Menu	
Angle	Menu	
Horizontal Gap	Menu	
Vertical Gap	Menu	
Frame Material	Menu	
Door Material	Menu	
Moulding Material	Menu	
Body Material	Menu	
Number of Vertical Panels	Menu	
Number of Horizontal Panels	Menu	
Moulding	Boolean	Yes/No
Basic Name	Free	
Set as Library	Boolean	Yes/No
Create Temporary Boolean Object	Boolean	Yes/No

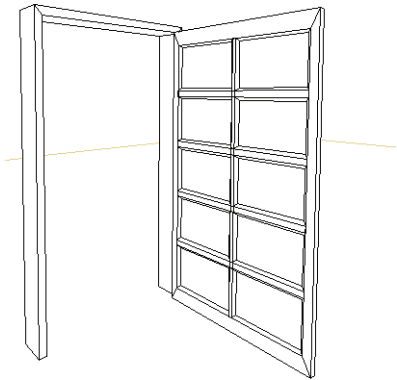


Figure 124.- Paneled Door - Hidden Line

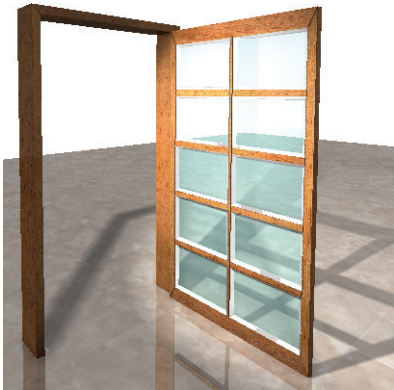


Figure 125.- Paneled Door- Solid Render

Glass Door Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Frame Thickness	Menu	
Frame Width	Menu	
Door Thickness	Menu	
Height	Free	
Width	Menu	
Angle	Menu	
Horizontal Gap	Menu	
Vertical Gap	Menu	
Frame Material	Menu	
Door Material	Menu	
Moulding Material	Menu	
Body Material	Menu	
Molding	Boolean	Yes/No
Basic Name	Free	
Set as Library	Boolean	Yes/No
Create Temporary Boolean Object	Boolean	Yes/No

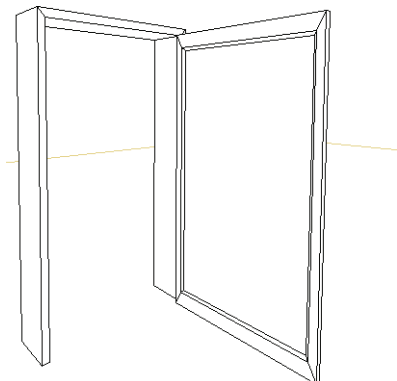


Figure 126.- Glass Door - Hidden Line

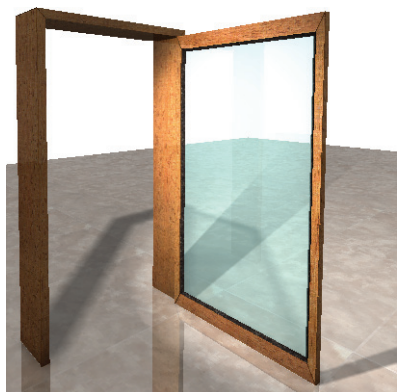


Figure 127.- Glass Door - Solid Render

Solid Door Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Frame Thickness	Menu	
Frame Width	Menu	
Door Thickness	Menu	
Height	Free	
Width	Menu	
Angle	Menu	
Frame Material	Menu	
Door Material	Menu	

Solid Door Parameters (Continued)

Parameter	Type	Description
Basic Name	Free	
Set as Library	Boolean	Yes/No
Create Temporary Boolean Object	Boolean	Yes/No

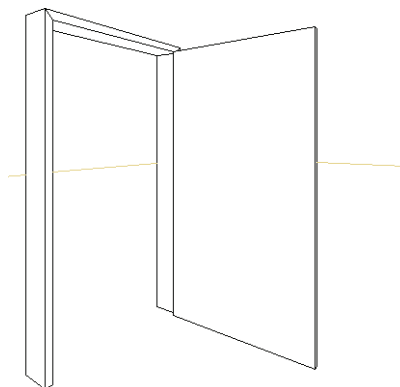


Figure 128.- Solid Door - Hidden Line

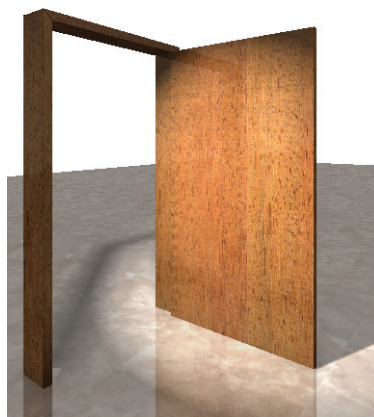


Figure 129.- Solid Door - Solid Render

Louvered Door Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No

Louvered Door Parameters (Continued)

Parameter	Type	Description
Frame Thickness	Menu	
Frame Width	Menu	
Door Thickness	Menu	
Height	Free	
Width	Menu	
Angle	Menu	
Horizontal Gap	Menu	
Vertical Gap	Menu	
Frame Material	Menu	
Door Material	Menu	
Basic Name	Free	
Set as Library	Boolean	Yes/No
Create Temporary Boolean Object	Boolean	Yes/No

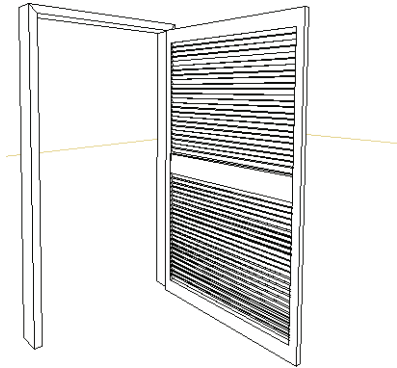


Figure 130.- Louvered Door - Hidden Line

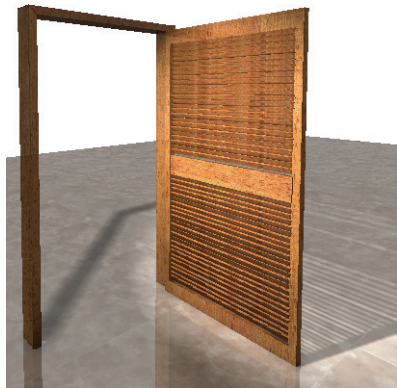


Figure 131.- Louvered Door - Solid Render

Windows Tools

Holds tools and toolsets related to the construction of Windows objects.



The following items are available in this toolset:

Windows Tools



Window from Library

This tool inserts windows from predefined Libraries



Punch Wall for Window

This tool constructs a solid shape that will be used to punch holes for windows



3D Windows from 2D

This tool constructs Window elements in 2D.



Rectangular Window

This tool constructs Rectangular Windows of various sizes.



Window sill

This tool constructs Windowsills of various sizes and materials.



Window Shutters

This tool constructs Window Shutters of various sizes and materials.



Window Blind

This tool constructs Window Blinds of various sizes and materials.



Louvered Panel

This tool constructs Louvered Panels of various sizes and materials.



Sliding Windows

This tool constructs Multi-pane Sliding Windows of various sizes and materials.



Glazed Window

This tool constructs Multi-pane Glazed Windows of various sizes and materials.



Double Casement Window

This tool constructs Double Casement Windows of various sizes and materials.

Window from Library

This tool inserts windows from predefined Libraries



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Draft / 3D Model

To Insert a Window from Library:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Window from Library Parameters**, page 77)
5. Select Insert in the right-hand menu in the tool manager.
6. The Selected Window will appear drawn at the origin, placed as a Library Item.



Window from Library Parameters

Parameter	Type	Description
Windows Libraries	Menu	
Blinds Libraries	Menu	
Windowsill Libraries	Men	

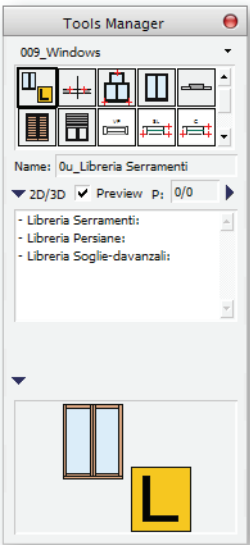


Figure 132.- Tool Manager - Window from Library

Punch Wall for Window

This tool construct a solid shape that will be used to punch holes for windows.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft / 3D Model

To Punch Wall for Window:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Punch Wall for Window Parameters**, page 78)
5. Select Insert in the right-hand menu in the tool manager.



6. Draw the construction vector.
7. The Constructed tool punch will appear drawn and ready to punch the window hole.

Punch Wall for Window Parameters

Parameter	Type	Description
Construction options	Menu	
Insertion Point	Menu	
Add Window Dimension object	Boolean	Yes/No
Number of decimals for Dimension ^a	Free	Positive Integer
Punch Shape Options	Menu	Rectangular/Circular/ Arch/Arcade
Number of circular steps ^b	Menu	
Width of hole	Free	Current Units
Height of Hole	Free	Current Units
Additional Height for Arch ^c	Free	Current Units
Sill height above floor	Free	Current Units
Outside hole width	Free	Current Units
Inside Hole Oversize	Free	Current Units
Hole oversize depth	Free	Current Units
Hole Oversize Bevel	Free	Current Units
Outside Indent Height	Free	Current Units
Outside Indent Base Elevation	Free	Current Units
Create Indent for Window Pane	Boolean	Yes/No
Window Panel Thickness ^d	Free	Current Units
Windowsill Thickness	Free	Current Units

- a. active only if "Add Dimension" is checked.
- b. active only if circular or arch shapes are selected above.
- c. active only for arched punch shapes.
- d. active only if above parameter is checked.

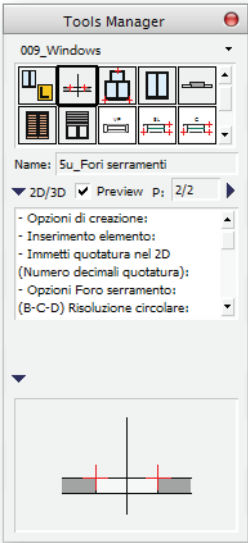


Figure 133.- Tool Manager - Punch Wall for Window

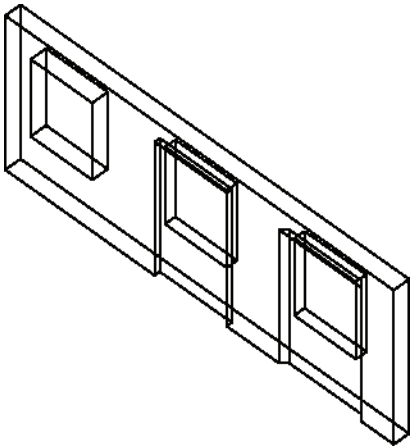


Figure 134.- Sample - Punch Wall for Window - I

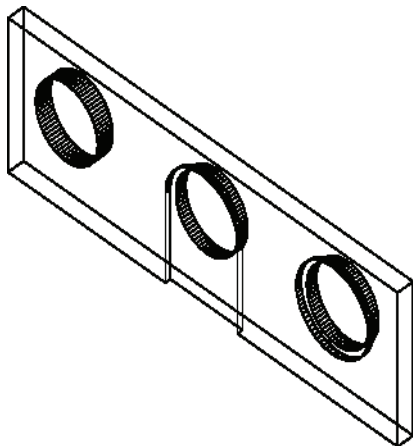


Figure 135.- Sample - Punch Wall for Window - II

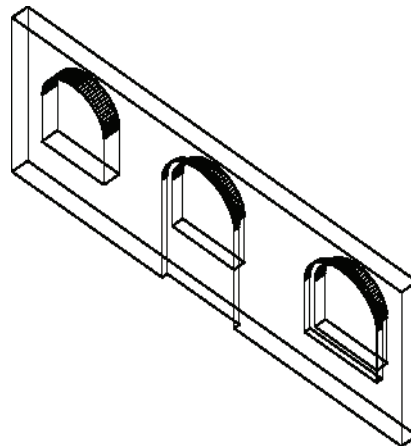


Figure 137.- Sample - Punch Wall for Window - IV

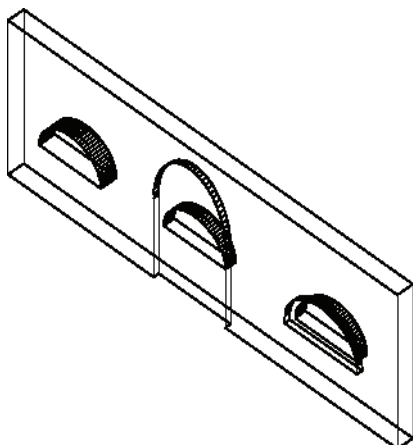


Figure 136.- Sample - Punch Wall for Window - III

3D Windows from 2D

This tool constructs 3D Windows from one or more selected elements in 2D.



Note: This tool is invoked in the 2D drawing mode. Its results are drawn in the 3D modeling Mode.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft^a

a. This tool is active only in vertical views (Front/Back/Left/Right)

Before invoking this tool, draw a set of 2D shapes that will be used as a rough diagram for the finished window.

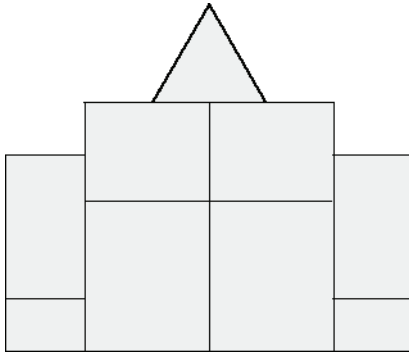




Figure 138.- Initial 2D Shape set - Shown in a "Vertical View"¹

To Construct 3D Windows from 2D:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **3D Windows from 2D Parameters**, page 80)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The tool will draw one 3D glazed window frame for each selected 2D object. It will also draw the

composite boolean object that will be used to punch the window hole.

3D Windows from 2D Parameters

Parameter	Type	Description
Construction options	Menu	
Create Window Pane	Boolean	Yes/No
Insertion Point	Menu	
Add Window Dimension object	Boolean	Yes/No
Number of decimals for Dimension ^a	Free	Positive Integer
Window Type	Menu	Standard / French
Window Material	Menu	
Window Pane Frame width	Free	Current Units
Window Pane Thickness	Free	Current Units
Window Sill Elevation	Free	Current Units
Create Vertical Profile	Free	Current Units
Vertical Profile Height ^b	Free	Current Units
Handle options	Menu	
Number of Movable Panes	Free	Positive integer
Include Last Handle	Boolean	Yes/No
Include Hinges	Boolean	Yes/No
One Piece Pane	Boolean	Yes/No
Window Punch Options	Menu	
Wall Thickness	Free	Current Units
Cut Window Indent	Boolean	Yes/No
Window Indent Oversize	Free	Current Units
Window Indent base elevation	Free	Current Units
Windowsill Thickness	Free	Current Units
Windowpane inset	Free	Current Units

a. active only if "Add Dimension" is checked.

b. active only if "Add Window Dimension object" is checked.

1. Front, Back, Left or Right

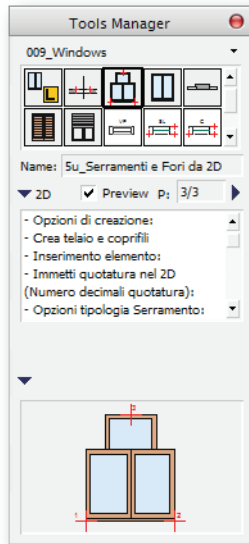


Figure 139.- Tool Manager - 3D Windows from 2D

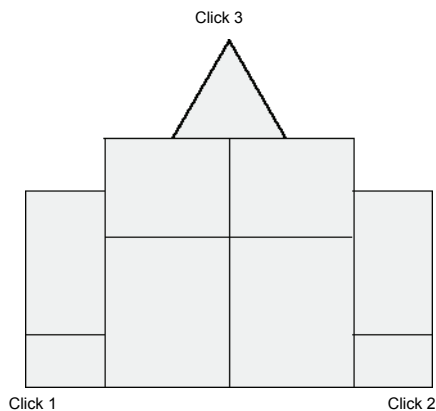


Figure 140.- Construction - 3D Windows from 2D

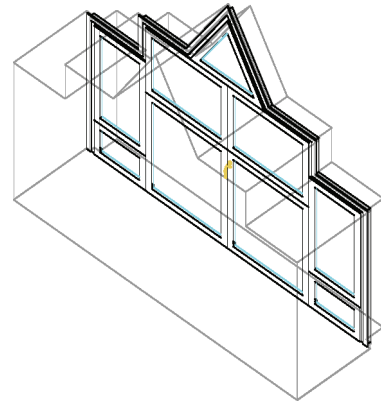


Figure 141.- Resulting Window and Punch Object

Rectangular Window

This tool constructs Rectangular Windows of various sizes.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Rectangular Window:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Rectangular Window Parameters**, page 82)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.



7. The Constructed Rectangular Window will appear drawn and Selected.

Rectangular Window Parameters

Parameter	Type	Description
Construction options	Menu	
Create Window Pane	Boolean	Yes/No
Insertion Point	Menu	
Add Window Dimension object	Boolean	Yes/No
Number of decimals for Dimension ^a	Free	Positive Integer
Window Material	Menu	
Window Type	Menu	Standard / French
Handle options	Menu	
Number of Panes	Free	Positive Integer
Include Last Handle	Boolean	Yes/No
Window Width	Free	Current Units
Window Height	Free	Current Units
Window Pane Frame width	Free	Current Units
Window Pane Thickness	Free	Current Units
Window Sill Elevation	Free	Current Units
Create Vertical Profile	Free	Current Units
Window Punch Options	Menu	
Window Indent Oversize	Free	Current Units
Window Indent Depth	Free	Current Units
Window Indent Bevel	Free	Current Units
Window Top Height	Free	Current Units
Window Indent base elevation	Free	Current Units
Windowsill Thickness	Free	Current Units
Windowpane inset	Free	Current Units

a. active only if "Add Dimension" is checked.

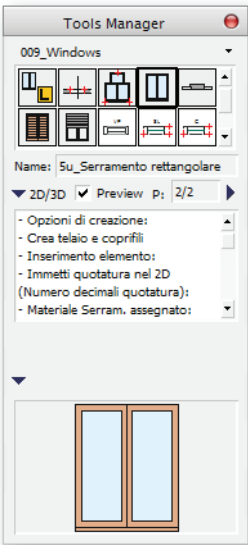


Figure 142.- Tool Manager - Rectangular Window

Window sill

This tool constructs Window sills of various sizes and materials.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Window sill:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Window sill Parameters**, page 83)
5. Select Insert in the right-hand menu in the tool manager.



6. Draw the construction vectors.
7. The Constructed Window sill will appear drawn and selected.

Window sill Parameters

Parameter	Type	Description
Construction options	Menu	
Insertion Point	Menu	
Windowsill Type	Menu	
Windowsill Material	Menu	
Windowsill Window Width	Free	Current Units
Windowsill Thickness	Free	Current Units
Windowsill Elevation	Free	Current Units
Wall Thickness	Free	Current Units
Windowsill Drip Edge Extension length	Free	Current Units
Windowsill Drip Edge Extension width	Free	Current Units
Window Indent Oversize	Free	Current Units
Window Indent Depth	Free	Current Units
Add Internal Moulding	Boolean	Yes/No
Internal Molding Width	Free	Current Units
Internal Molding Height	Free	Current Units

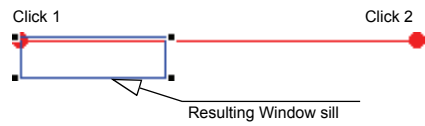


Figure 143.- Construction - Window sill

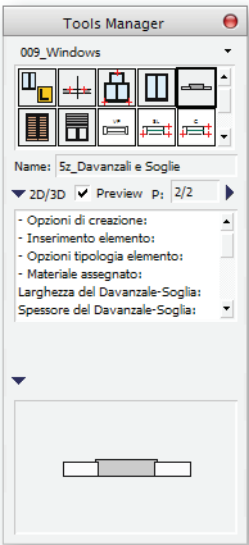


Figure 144.- Tool Manager - Window sill

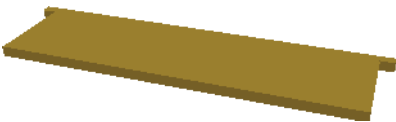


Figure 145.- Sample - Window sill

Window Shutters

This tool constructs Window Shutters of various sizes and materials.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct Window Shutters:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Window Shutters Parameters**, page 84)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The Constructed Window Shutters will appear drawn and selected.



Window Shutters Parameters

Parameter	Type	Description
Construction options	Menu	
Insertion Point	Menu	
Shutter Type	Menu	Left/Right/Both
Shutter Opens...	Menu	Swing/Slide
Shutter Louver Options	Menu	
Louvered Panels	Free	Positive Integer
Add Facing	Boolean	Yes/No
Louver Material	Menu	
Window Width	Free	Current Units
Window Height	Free	Current Units
Louver Frame width	Free	Current Units
Windowsill Elevation	Free	Current Units

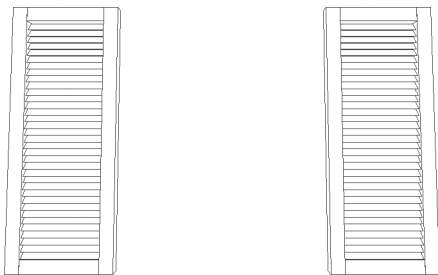


Figure 146.- Sample - Window Shutters

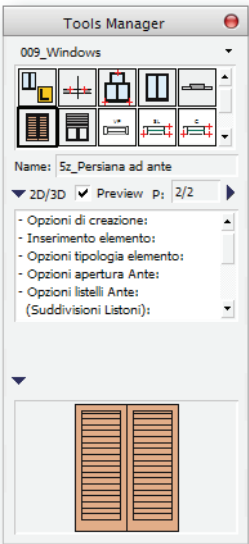


Figure 147.- Tool Manager - Window Shutters

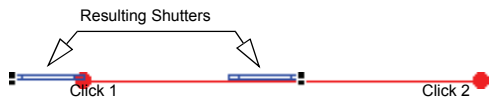


Figure 148.- Construction - Window Shutters

Window Blind

This tool constructs Window Blinds of various sizes and materials.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Window Blind:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Window Blind Parameters**, page 85)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The Constructed Window Blind will appear drawn and selected.

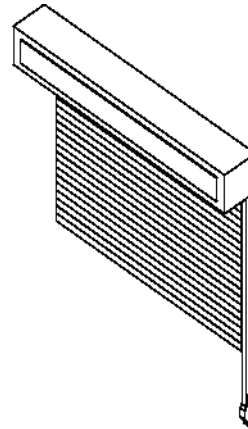


Figure 149.- Sample - Window Blind I

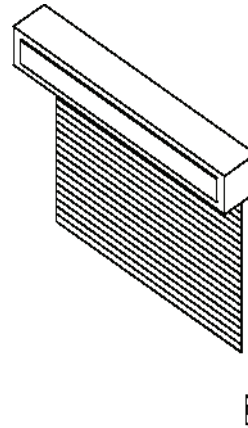


Figure 150.- Sample - Window Blind II

Window Blind Parameters

Parameter	Type	Description
Construction options	Menu	
Insertion Point	Menu	
Blind Mechanism	Menu	
Blind is drawn...	Menu	Lowered, etc.
Blind Material	Menu	
Window Width	Free	Current Units
Window Height	Free	Current Units
Windowsill Elevation	Free	Current Units
Window Indent Oversize	Free	Current Units
Window Indent Depth	Free	Current Units
Blind Element width	Free	Current Units
Blind Separated from pane	Free	Positive Integer
Add Facing	Boolean	Yes/No
Wall Thickness	Free	Current Units
Casement Material	Free	Current Units

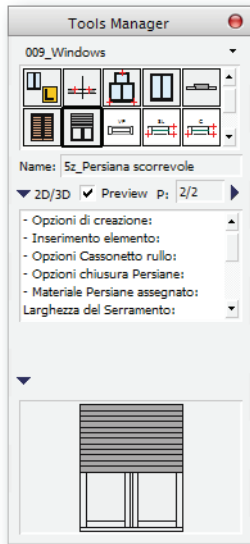


Figure 151.- Tool Manager - Window Blind

Louvered Panel

This tool constructs Louvered Panels of various sizes and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model

To Construct a Louvered Panel:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Louvered Panel Parameters**, page 86)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The Constructed Louvered Panel will appear drawn and selected.

Louvered Panel Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Frame Type	Menu	
Handle Type	Menu	
Panel Height ^a	Free	Current Units
Panel Width ^b	Free	Current Units
Horizontal Frame Thickness	Free	Current Units
Vertical Frame Thickness	Free	Current Units
Louver Angle	Free	Current Angular Units
Basic Name	Free	
Create as Library	Boolean	Yes/No
Add Boolean Object	Boolean	Yes/No

- a. Active only if "Use Vector" is unchecked.
b. Active only if "Use Vector" is unchecked.

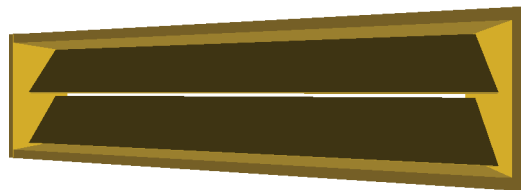


Figure 152.- Sample - Louvered Panel

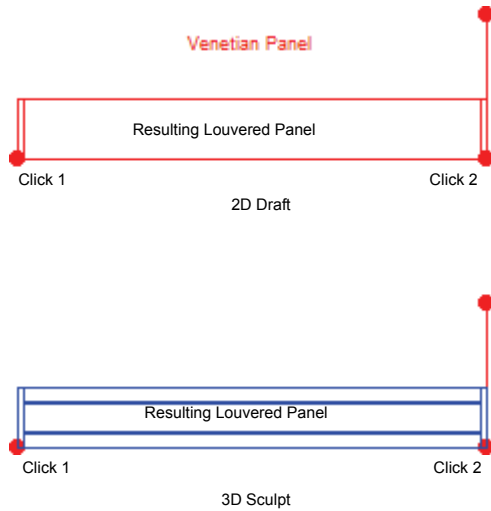


Figure 153.- Construction - Louvered Panel

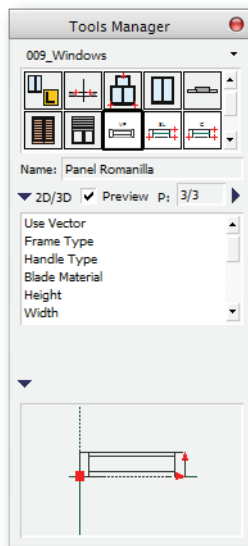


Figure 154.- Tool Manager - Louvered Panel

Sliding Windows

This tool constructs Multi-pane Sliding Windows of various sizes and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model

To Construct a Sliding Windows:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Sliding Windows Parameters**, page 87)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The Constructed Sliding Windows will appear drawn and selected.



Sliding Windows Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Base Elevation	Free	Current Units
Height ^a	Free	Current Units
Width ^b	Free	Current Units
Number Sliding Panels	Free	Positive Integer
Frame Thickness	Menu	
Frame Width	Menu	
Frame Material	Menu	
Glass Material	Menu	
Basic Name	Free	
Create Library	Boolean	Yes/No
Add Boolean Object	Boolean	Yes/No

a. Active only if "Use Vector" is unchecked.

b. Active only if "Use Vector" is unchecked.

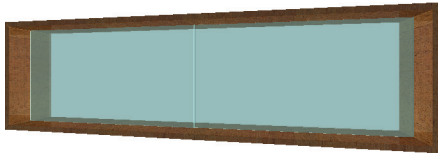


Figure 155.- Sample - Sliding Windows

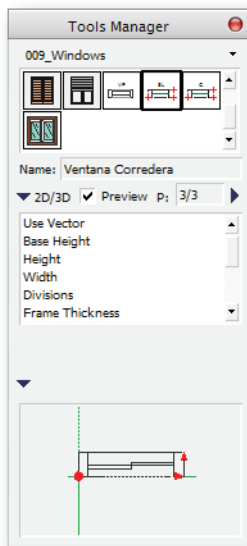


Figure 156.- Tool Manager - Sliding Windows

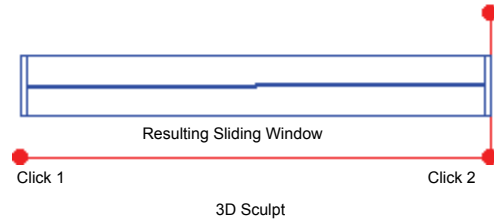
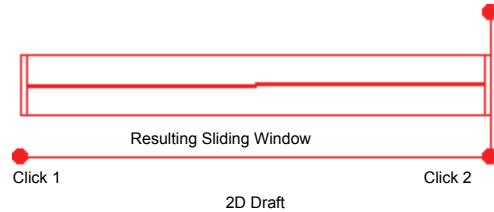


Figure 157.- Construction - Sliding Windows

Glazed Window

This tool constructs Multi-pane Glazed Windows of various sizes and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model

To Construct a Glazed Window:

1. If the Tool Manager is not visible, select **Win-**
dows > Tool Manager.
2. If necessary, double click on the Win-
dows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required param-
eter from the tool's parameter list (See
Glazed Window Parameters, page 89)
5. Select Insert in the right-hand menu in the tool
manager.
6. Draw the construction vectors.



7. The Constructed Glazed Window will appear drawn and selected.

Glazed Window Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Base Elevation	Free	Current Units
Height ^a	Free	Current Units
Width ^b	Free	Current Units
Frame Thickness	Menu	
Frame Width	Menu	
Frame Material	Menu	
Glass Material	Menu	
Basic Name	Free	
Create Library	Boolean	Yes/No
Add Boolean Object	Boolean	Yes/No

- a. Active only if “Use Vector” is unchecked.
- b. Active only if “Use Vector” is unchecked.

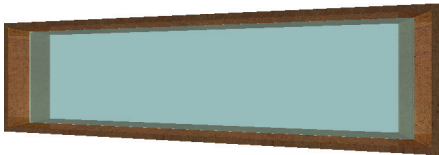


Figure 158.- Sample - Glazed Window

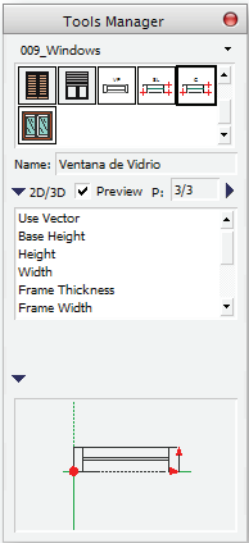


Figure 159.- Tool Manager - Glazed Window

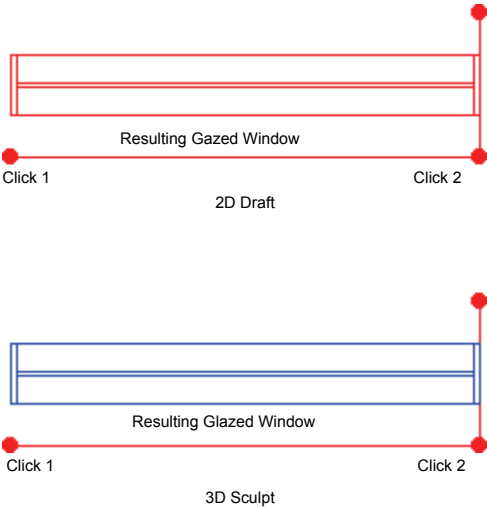


Figure 160.- Construction - Glazed Window

Double Casement Window

This tool constructs Double Casement Windows of various sizes and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model

To Construct a Double Casement Window:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Windows Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Double Casement Window Parameters**, page 90)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors.
7. The Constructed Double Casement Window will appear drawn and selected.



Double Casement Window Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Window Center Pane Type	Menu	
Handle Options	Menu	
Frame Type	Menu	
Base Elevation	Free	Current Units
Height ^a	Free	Current Units
Width ^b	Free	Current Units
Center Pane Width Factor	Free	Positive Integer
Vertical Bar Width	Free	Current Units

Double Casement Window Parameters

Parameter	Type	Description
Movable Pane Frame Width	Free	Current Units
Window Frame Material	Menu	
Movable Pane Frame Material	Menu	
Glass Material	Menu	
Louver Material		
Frame Thickness	Menu	
Frame Width	Menu	
Pane Opening Angle	Menu	
Basic Name	Free	
Create as Library	Boolean	Yes/No
Add Boolean Object	Boolean	Yes/No
Add Object text (2D)	Boolean	Yes/No

- a. Active only if "Use Vector" is unchecked.
b. Active only if "Use Vector" is unchecked.

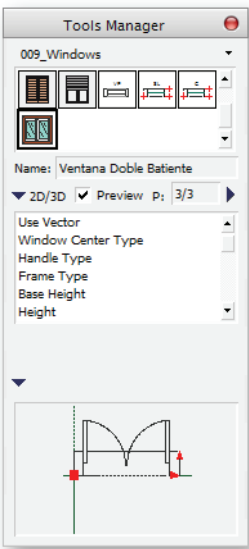


Figure 161.- Tool Manager - Double Casement Window

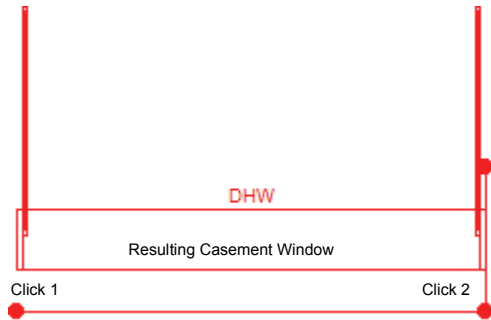


Figure 162.- Construction - Double Casement Window



Figure 163.- Sample - Double Casement Window

Stairs Tools

Holds tools and toolsets related to the construction of Stairs objects.



The following items are available in this toolset:

Stairs Tools

	Cut 3D Object	This tool executes boolean cut operations on 3D objects	
		Note: This tool is fully documented in DCAD VectorSpace Commands , page 153.	
	Stair Transition from 2D	This tool constructs 1 to 3 step square 90° Transitions between stair flights starting from a 2D shape.	
	3D Transition	This tool constructs 1 to 3 step square 90° Transitions between stair flights.	
	Stair Treads from 2D	This tool constructs Step tops starting from a 2D plan shape.	
	Spiral Stair	This tool constructs several types spiral stairs of various sizes and materials	
	Single Flight Staircase [I]	This tool constructs one flight of stairs in several types and materials.	
	Two-Flight U Staircase	This tool constructs two-flight U-shaped Staircases, in several types and materials.	
	Stair Steps from a 2D Shape	This tool constructs Stair Steps starting from a 2D shape.	
	Stair Steps from a 3D Polyline	This tool constructs Stair Steps starting from a 3D Polyline.	
	Single Flight Staircase [II]	This tool constructs one flight of stairs in several types and materials.	



Stair Transition from 2D

This tool constructs 1 to 3 step square 90° Transitions between stair flights starting from a 2D shape.



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

To Construct a Stair Transition from 2D:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Stair Transition from 2D Parameters**, page 93)
5. Select the desired 2D basic shape.
6. Select Insert in the right-hand menu in the tool manager.
7. The Constructed Stair Transition from 2D will appear drawn and selected.

Stair Transition from 2D Parameters

Parameter	Type	Description
Number of steps	Free	Positive Integer (1-3)
Number of Steps in preceding flight	Free	Positive Integer
Height of Preceding Step	Free	Current Units
Step-Transition Overlap	Free	Current Units
Base Elevation - Preceding Flight	Free	Current Units

Stair Transition from 2D Parameters (Continued)

Parameter	Type	Description
Create Single Element	Boolean	Yes/No

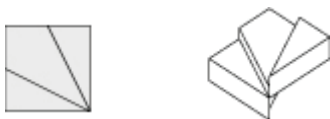


Figure 164.- Sample - Stair Transition from 2D

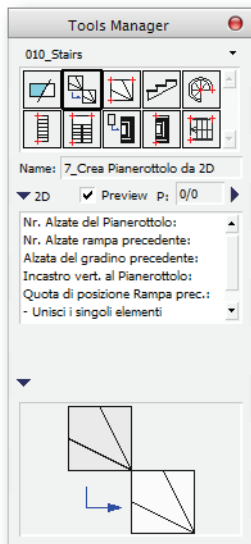


Figure 165.- Tool Manager - Stair Transition from 2D

3D Transition

This tool constructs 1 to 3 step square 90° Transitions between stair flights.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

To Construct a 3D Transition:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Transition Parameters**, page 94)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the two construction vectors.
7. The Constructed 3D Transition will appear drawn and selected.



3D Transition Parameters

Parameter	Type	Description
Number of steps	Free	Positive Integer (1-3)
Use Vector	Boolean	Yes/No
Transition Length ^a	Free	Current Units
Transition Width ^b	Free	Current Units
Number of Steps in preceding flight	Free	Positive Integer
Height of Preceding Step	Free	Current Units
Step-Transition Overlap	Free	Current Units
Base Elevation - Preceding Flight	Free	Current Units

3D Transition Parameters (Continued)

Parameter	Type	Description
Create Single Element	Boolean	Yes/No

- a. active only if "Use Vector" is checked.
b. active only if "Use Vector" is checked.

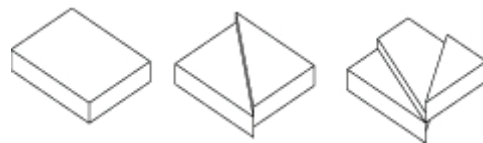


Figure 166.- Sample - 3D Transition

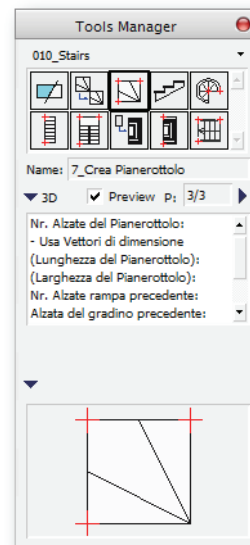


Figure 167.- Tool Manager - 3D Transition



Stair Treads from 2D

This tool constructs Step tops starting from a 2D plan shape.



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

To Construct Stair Treads from 2D:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Stair Treads from 2D Parameters**, page 95)
5. Select the desired 2D basic shape.
6. Select Insert in the right-hand menu in the tool manager.
7. The Constructed Stair Treads from 2D will appear drawn and selected.

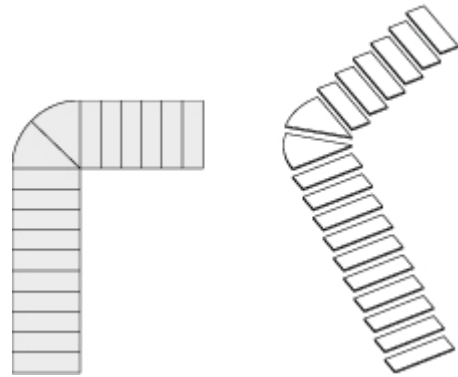


Figure 168.- Sample - Stair Treads from 2D

Stair Treads from 2D Parameters

Parameter	Type	Description
Tread Material	Menu	
Total Number of Treads	Free	Positive Integer
Tread Thickness	Free	Current Units
Step Height	Free	Current Units
Staircase Base Elevation	Free	Positive Integer
When Finished Show...	Menu	2D/3D

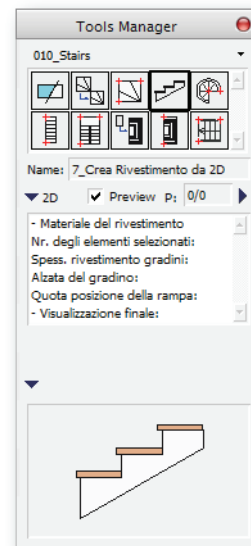


Figure 169.- Tool Manager - Stair Treads from 2D



Spiral Stair

This tool constructs several types spiral stairs of various sizes and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

To Construct a Spiral Stair:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Spiral Stair Parameters**, page 96)
5. Select Insert in the right-hand menu in the tool manager.
6. Click on the center of the Spiral Stair's core.
7. Click to set a vector that establish the stair's starting tread orientation.
8. Click to set a second vector that defines the direction of rotation.
9. The Constructed Spiral Stair will appear drawn and selected.

Spiral Stair Parameters

Parameter	Type	Description
Height	Free	Current Units
External Radius	Free	Current Units
Internal Radius	Free	Current Units
Target Step Height	Free	Current Units
Tread Length	Free	Current Units
Handrail Type	Menu	
Handrail Height	Free	Current Units

Spiral Stair Parameters (Continued)

Parameter	Type	Description
Handrail Width	Menu	
Tread Material	Menu	
Stile Material	Menu	
Handrail Material	Menu	
Solid Railing Material	Menu	
Quality	Menu	1/2/3
Stair Base Elevation	Free	Current Units
Construct Central Support	Boolean	Yes/No
Create Boolean Object	Boolean	Yes/No

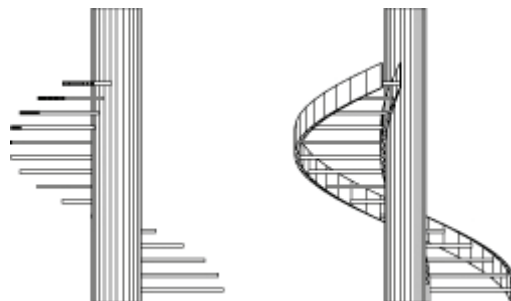


Figure 170.- Sample - Spiral Stair - I

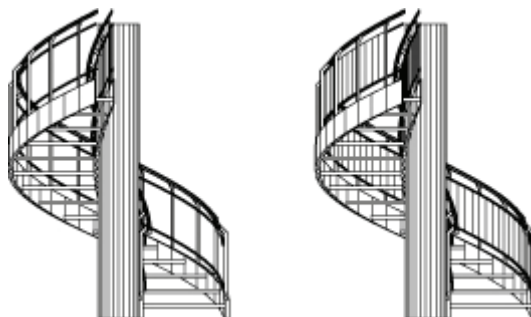


Figure 171.- Sample - Spiral Stair - II

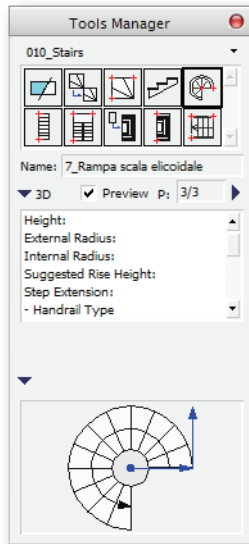


Figure 172.- Tool Manager - Spiral Stair

Single Flight Staircase [I]

This tool constructs one flight of stairs in several types and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To Construct a Single Flight Staircase [I]:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Single Flight Staircase [I] Parameters**, page 97)
5. Select Insert in the right-hand menu in the tool manager.



6. Click on the starting point of the stairs flight.
7. Click to set a vector that establish the stair's orientation.
8. Click to set a second vector that defines the staircase width.
9. The Constructed Single Flight Staircase [I] will appear drawn and selected.

Single Flight Staircase [I] Parameters

Parameter	Type	Description
Creation Options	Menu	
Ramp Thickness	Free	Current Units
Ramp Material	Menu	
Step Height	Free	Current Units
Tread Width	Free	Current Units
Ramp Width	Free	Current Units
Ramp Thickness	Free	Current Units
Use Vector	Boolean	Yes/No

Single Flight Staircase [I] Parameters (Continued)

Parameter	Type	Description
Number of Steps	Free	Positive Integer
Ramp Base Elevation	Free	Current Units
Number of Preceding Steps	Free	Positive Integer
Height of Preceding Steps	Free	Current Units
Cut Ramp Base	Boolean	Yes/No
Include Last Step	Boolean	Yes/No

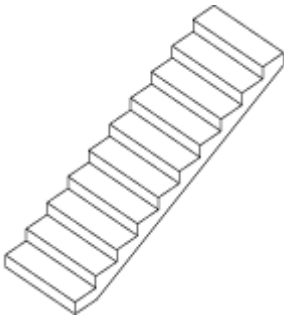


Figure 173.- Sample - Single Flight Staircase [I] - I

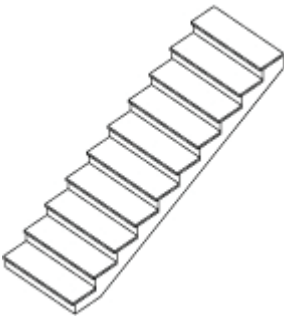


Figure 174.- Sample - Single Flight Staircase [I] - II

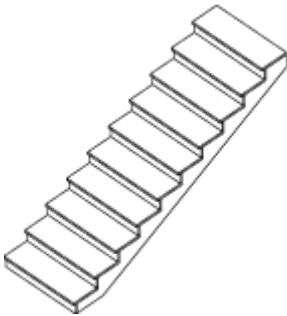


Figure 175.- Sample - Single Flight Staircase [I] - III

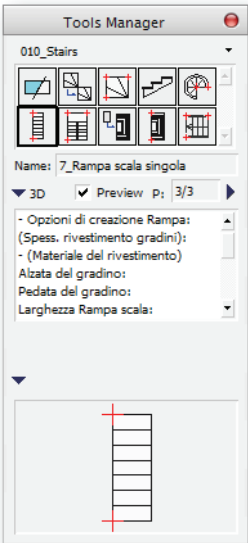


Figure 176.- Tool Manager - Single Flight Staircase [I]

Two-Flight U Staircase



This tool constructs two-flight U-shaped Staircases, in several types and materials.




Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

To Construct a Two-Flight U Staircase:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the Stairs Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Two-Flight U Staircase Parameters**, page 99)
5. Select Insert in the right-hand menu in the tool manager.
6. Click on the starting point of the first flight of stairs.
7. Click to set a vector that establishes the stair's orientation.
8. Click to set a second vector that defines the staircase width.

Note: Be sure to set the full stairwell width.

9. The Constructed Two-Flight U Staircase will appear drawn and selected. 

Two-Flight U Staircase Parameters

Parameter	Type	Description
Creation Options	Menu	
Ramp Thickness	Free	Current Units
Ramp Material	Menu	
Step Height	Free	Current Units
Tread Width	Free	Current Units
Ramp Width	Free	Current Units
Ramp Thickness	Free	Current Units
Transition Length	Free	Current Units
Transition Width	Free	Current Units
Number of Steps	Free	Positive Integer
Ramp Base Elevation	Free	Current Units
Number of Preceding Steps	Free	Positive Integer
Height of Preceding Steps	Free	Current Units
Cut Ramp Base	Boolean	Yes/No
Include Last Step	Boolean	Yes/No

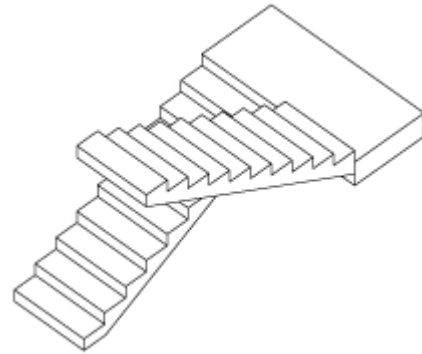


Figure 177.- Sample - Two-Flight U Staircase - I

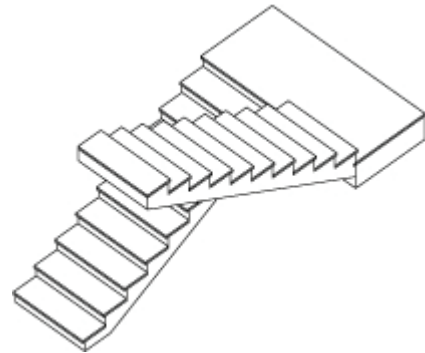


Figure 178.- Sample - Two-Flight U Staircase - II

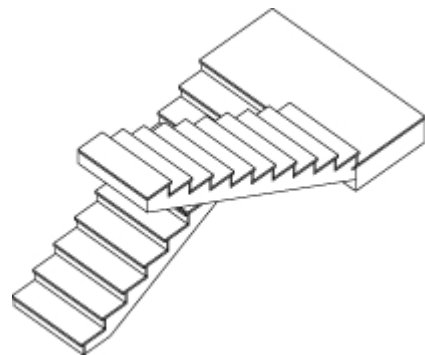


Figure 179.- Sample - Two-Flight U Staircase - III

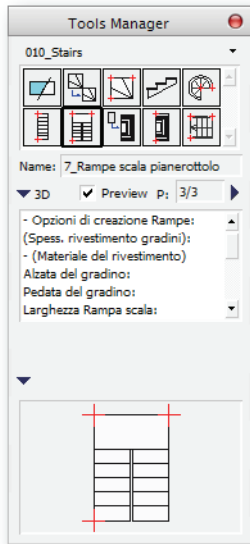


Figure 180.- Tool Manager - Two-Flight U Staircase

Stair Steps from a 2D Shape

This tool constructs Stair Steps starting from a 2D shape.

Number of construction points: None
Number of Construction Vectors: None
Mode:2D Draft



Note: Use caution when selecting curves as seed shapes. The total number of allowed 3D faces could be exceed.



The error will stop the drawing. Cut curve into several pieces to obtain desired results.

To Construct Stair Steps from a 2D Shape:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Stair Steps from a 2D Shape Parameters**, page 100)
5. Select the seed 2D Shape



6. Select Insert in the right-hand menu in the tool manager.
7. The Constructed Stair Steps from a 2D Shape will appear drawn and selected.

Stair Steps from a 2D Shape Parameters

Parameter	Type	Description
Creation Options	Menu	
Ramp Material	Menu	
Tread Thickness	Free	Menu
Step Height	Free	Current Units
Tread Width	Free	Current Units
Ramp Width	Free	Current Units

Stair Steps from a 2D Shape Parameters

Parameter	Type	Description
Ramp Thickness	Free	Current Units
Number of Steps	Free	Positive Integer
Ramp Base Elevation	Free	Current Units
Cut Ramp Base	Boolean	Yes/No
Include Last Step	Boolean	Yes/No
When Finished Show...	Menu	2D/3D

8.

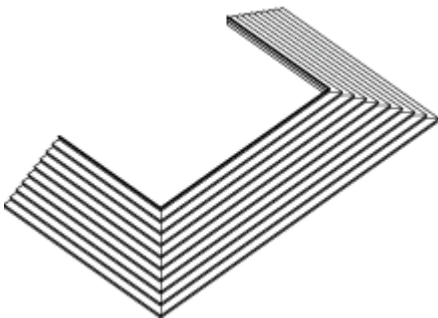


Figure 181.- Sample - Stair Steps from a 2D Shape - I

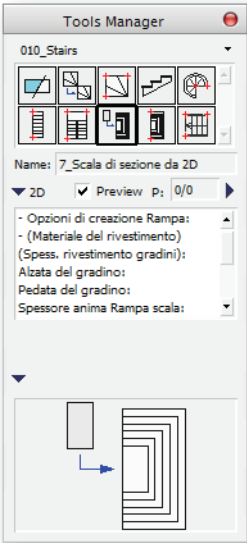


Figure 182.- Tool Manager - Stair Steps from a 2D Shape

Stair Steps from a 3D Polyline

This tool constructs Stair Steps starting from a 3D Polyline.



Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode:3D Model

To Construct Stair Steps from a 3D Polyline:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Stairs Tools folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Stair Steps from a 3D Polyline Parameters**, page 102)
5. Select Insert in the right-hand menu in the tool manager.
6. Construct the desired polyline



Note: Use caution when creating the polyline as seed shapes. The total number of allowed 3D faces could be exceed.



The error will stop the drawing. Cut polyline into several pieces to obtain desired results.

7. The Constructed Stair Steps from a 3D Polyline will appear drawn and selected.

Stair Steps from a 3D Polyline Parameters

Parameter	Type	Description
Creation Options	Menu	
Ramp Material	Menu	
Tread Thickness	Free	Menu
Step Height	Free	Current Units
Tread Width	Free	Current Units
Ramp Width	Free	Current Units
Ramp Thickness	Free	Current Units
Number of Steps	Free	Positive Integer
Ramp Base Elevation	Free	Current Units
Cut Ramp Base	Boolean	Yes/No
Include Last Step	Boolean	Yes/No

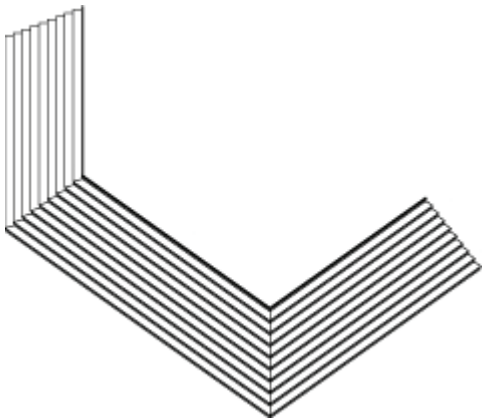


Figure 183.- Sample - Stair Steps from a 3D Polyline - I

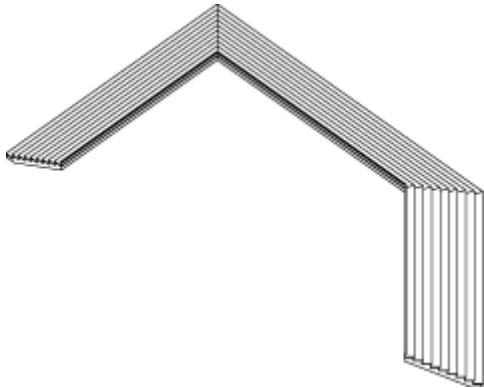


Figure 184.- Sample - Stair Steps from a 3D Polyline - II

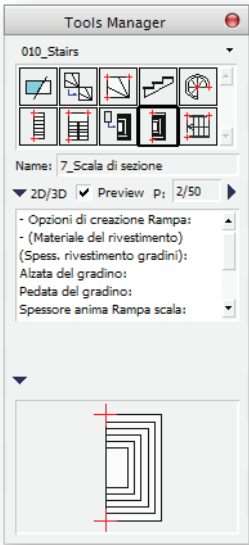


Figure 185.- Tool Manager - Stair Steps from a 3D Polyline

Single Flight Staircase [II]



This tool constructs one flight of stairs in several types and materials.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

To Construct a Single Flight Staircase [II]:

1. If the Tool Manager is not visible, select **Win-dows > Tool Manager**.

2. If necessary, double click on the Stairs Tools folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Single Flight Staircase [II] Parameters**, page 103)
5. Select Insert in the right-hand menu in the tool manager.
6. Click on the starting point of the stairs flight.
7. Click to set a vector that establish the stair's orientation.
8. Click to set a second vector that defines the staircase width.
9. The Constructed Single Flight Staircase [II] will appear drawn and selected.

Single Flight Staircase [II] Parameters

Parameter	Type	Description
Basic Name	Free	
Story Height	Free	Current Units
Width	Free	Current Units
Target Step Height	Free	Current Units
Step Type	Menu	
Handrail Type	Menu	
Number of Sub-Railings	Free	Positive Integer
Handrail Height	Free	Current Units
Handrail Width	Menu	
Tubing Number of Sides	Free	Positive Integer
Side Bean Width	Free	Current Units
Insertion	Menu	
Tread Material	Menu	
Handrail Material	Menu	
Tubing Material	Menu	
Structure Material	Menu	
Set as Library	Boolean	Yes/No
Library Name	Menu	



Figure 186.- Sample - Single Flight Staircase [I]

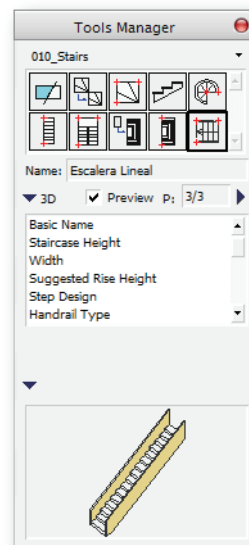


Figure 187.- Tool Manager - Single Flight Staircase [II]

Roof Tools

Holds tools and toolsets related to the construction of Roof objects.



The following items are available in this toolset:

Roof Tools

	Cut 3D Object	This tool executes boolean cut operations on 3D objects	<div>Note: This tool is fully documented in DCAD VectorSpace Commands, page 153.</div>
	Dome	This tool constructs dome shaped circular or elliptical based roofs	
	Polygonal Based Peaked Roof	This tool constructs Peaked Roofs based on a Polygonal Line	
	Roof from 2D	This tool constructs Flat or Pitched Roof Panels along a pre-created 2D Shape.	
	Polygonal Based Roof	This tool constructs Flat or Pitched Roof Panels along a polygonal path.	
	Rectangular Roof Panel	This tool constructs a Flat or Pitched Rectangular Roof Panel along a construction vector	
	Trapezoidal Roof Panel	This tool constructs a Flat or Pitched Trapezoidal Roof Panel along a construction vector	
	Triangular Roof Panel	This tool constructs a Flat or Pitched Triangular Roof Panel along a construction vector	
	Rain Gutter from 2D	This tool constructs square or round cross-section rain gutter following a predefined open or closed 2D shape.	
	3D Polygonal Rain Gutter	This tool constructs square or round cross-section rain gutter along a polygonal path.	



Dome

This tool constructs dome shaped circular or elliptical based roofs.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

To Construct a Dome:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Dome Parameters**, page 105)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the two construction vectors
7. The Constructed Dome will appear drawn and selected.

Dome Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Dome Base Length ^a	Free	Current Units
Dome Base Width ^b	Free	Current Units
Dome Height	Free	Current Units
Deployment Angle ^c	Free	Current Angular Units 0°-360°
Number of Polygon Segments ^d	Free	Positive Integer
Dome Thickness	Free	Current Units
Number of segments for Dome Base	Free	Positive Integer
Dome Base Elevation	Free	Current Units

- a. Active only if "Use Vector" is unchecked
- b. Active only if "Use Vector" is unchecked
- c. Defines complete (360°) or partial (<360°) deployment of the dome
- d. The higher the value, the smoother the construction of the dome

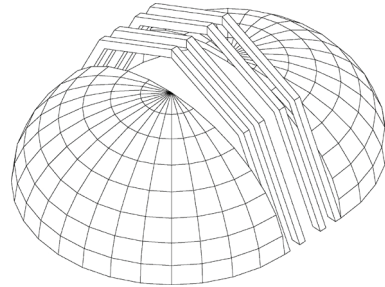


Figure 188.- Two domes drawn with a deployment Angle of 180°

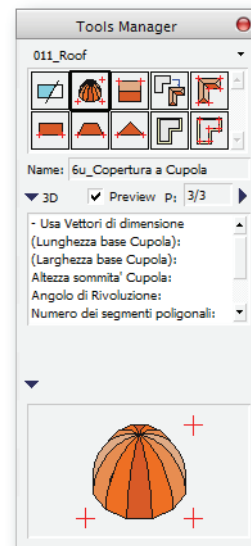


Figure 189.- Tool Manager - Dome

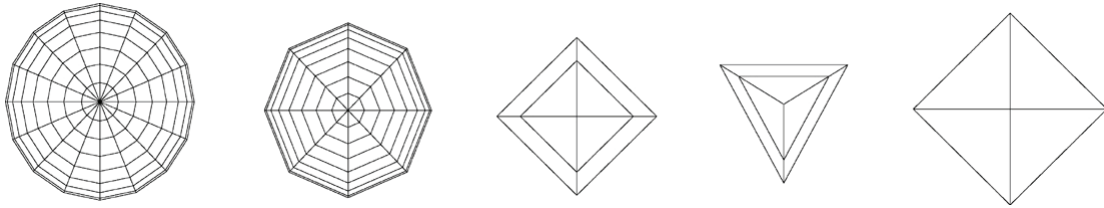


Figure 190.- Plan View - Some samples of domes drawn with different Number of Polygon Segments values

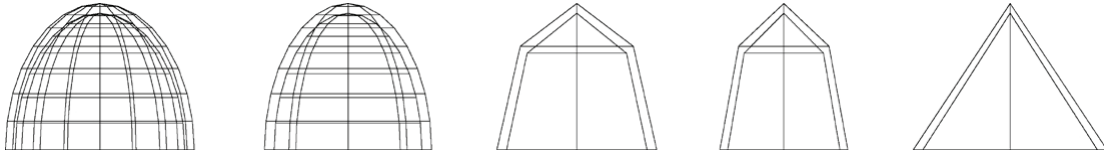
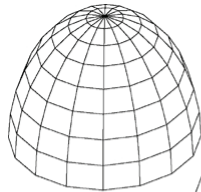
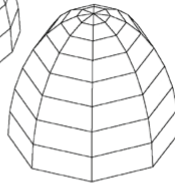


Figure 191.- Front View - Some samples of domes drawn with different Number of Polygon Segments values

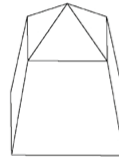
Polygonal Segments: 8
Dome Sides: 16
Deployment Angle: 360°



Polygonal Segments: 8
Dome Sides: 8
Deployment Angle: 360°



Polygonal Segments: 2
Dome Sides: 4
Deployment Angle: 360°



Polygonal Segments: 2
Dome Sides: 3
Deployment Angle: 360°



Polygonal Segments: 1
Dome Sides: 4
Deployment Angle: 360°

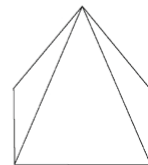


Figure 192.- Perspective View of the Domes

Polygonal Based Peaked Roof

This tool constructs Peaked Roofs based on a Polygonal Line.



Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode: 3D Model

To Construct a Polygonal Based Peaked Roof:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.



3. Select (click) the tool's icon.
 4. Select and modify any required parameter from the tool's parameter list (See **Polygonal Based Peaked Roof Parameters**, page 107)
 5. Select Insert in the right-hand menu in the tool manager.
 6. Draw the Polygonal line that governs the construction of the roof
- Finish The Line with a double click on the last point.
7. The Constructed Polygonal Based Peaked Roof will appear drawn and selected.

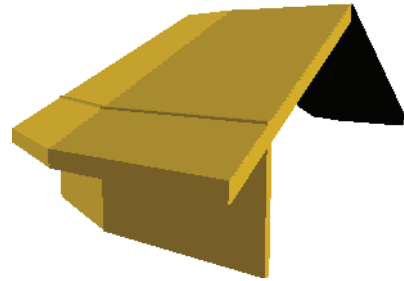


Figure 193.- Sample - Polygonal Based Peaked Roof

Polygonal Based Peaked Roof Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	
Roof Cover Span	Free	Current Units
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Thickness	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

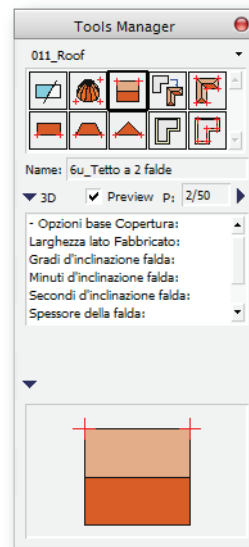


Figure 194.- Tool Manager - Polygonal Based Peaked Roof

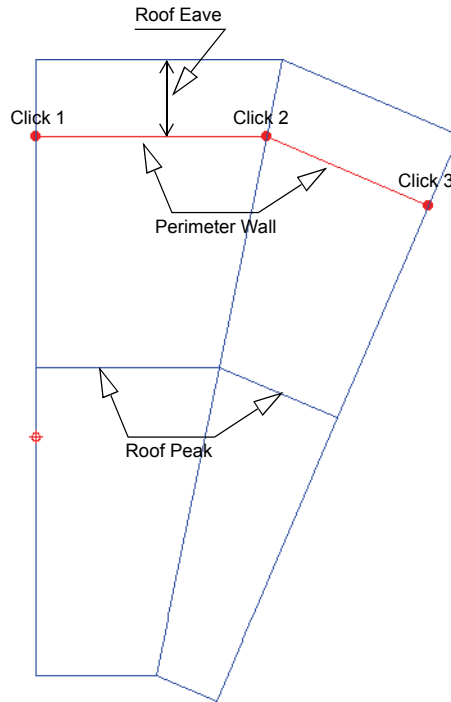


Figure 195.- Construction.- Polygonal Based Peaked Roof

Roof from 2D

This tool constructs Flat or Pitched Roof Panels along a pre-created 2D Shape. A free drawn vector controls the roof panel length from the peak to the eave.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft

To Construct a Roof from 2D:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Roof from 2D Parameters**, page 108)
5. Select the 2D shape that will be used to draw the roof.
6. Select Insert in the right-hand menu in the tool manager.
7. Draw a free vector anywhere convenient to indicate the distance from peak to eave.
8. The Constructed Roof from 2D will appear drawn and selected.

Roof from 2D Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	

Roof from 2D Parameters (Continued)

Parameter	Type	Description
Roof Cover Span	Free	Current Units
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Thickness	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

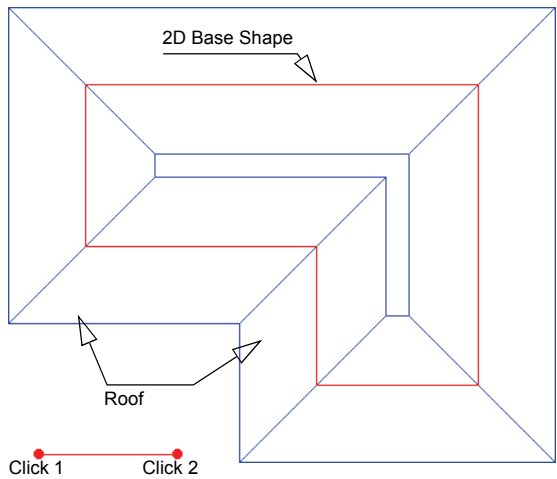


Figure 196.- Construction.- Roof from 2D

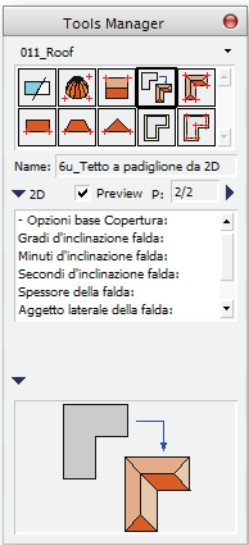


Figure 197.- Tool Manager - Roof from 2D

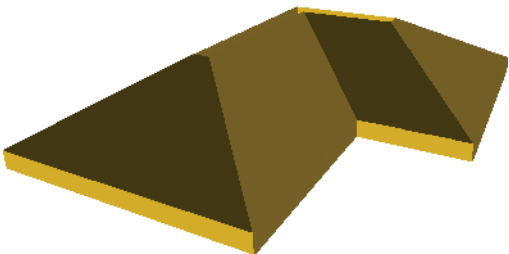


Figure 198.- Sample - Roof from 2D

Polygonal Based Roof

This tool constructs Flat or Pitched Roof Panels along a polygonal path.



Number of construction points: 2-50
Number of Construction Vectors: 1-49
Mode:3D Model

To Construct a Polygonal Based Roof:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Polygonal Based Roof Parameters**, page 110)
5. Select Insert in the right-hand menu in the tool manager.



6. Draw the Polygonal line that governs the construction of the roof
- Finish The Line with a double click on the last point. The polygonal should **ALWAYS** be closed.
7. The Constructed Polygonal Based Roof will appear drawn and selected.

Polygonal Based Roof Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	
Roof Cover Span	Free	Current Units
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Thickness	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

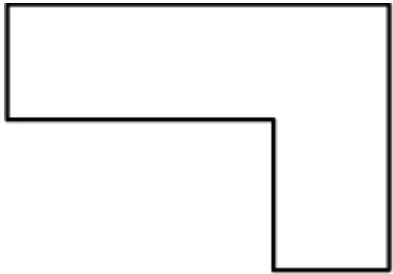


Figure 200.- Sample - Polygonal Based Roof - I

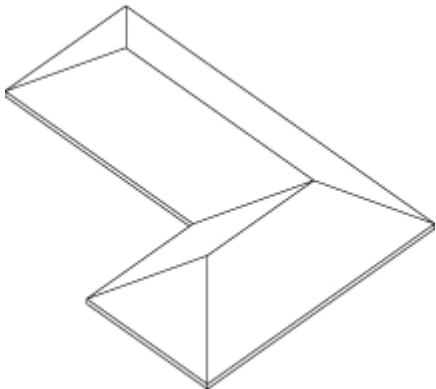


Figure 201.- Sample - Polygonal Based Roof - II

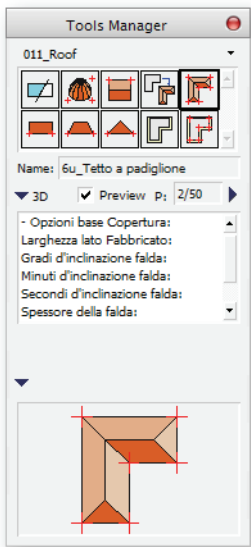


Figure 199.- Tool Manager - Polygonal Based Roof

Rectangular Roof Panel

This tool constructs a Flat or Pitched Rectangular Roof Panel along a construction vector



Number of construction points: 2
Number of Construction Vectors: 1
Mode:3D Model

To Construct a Rectangular Roof Panel:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Rectangular Roof Panel Parameters**, page 111)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the Vector that governs the construction of the roof



Note: The roof panel will be created to the Right of the construction Vector.



7. The Constructed Rectangular Roof Panel will appear drawn and selected.

Rectangular Roof Panel Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	
Roof Cover Span	Free	Current Units
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Thickness	Free	Current Units
Lateral Roof Overhang	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

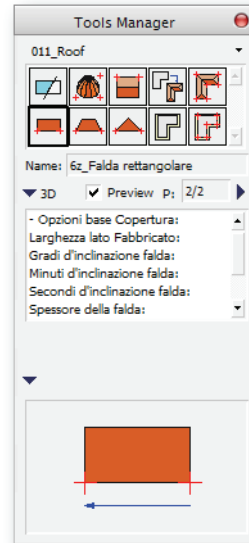


Figure 202.- Tool Manager - Rectangular Roof Panel

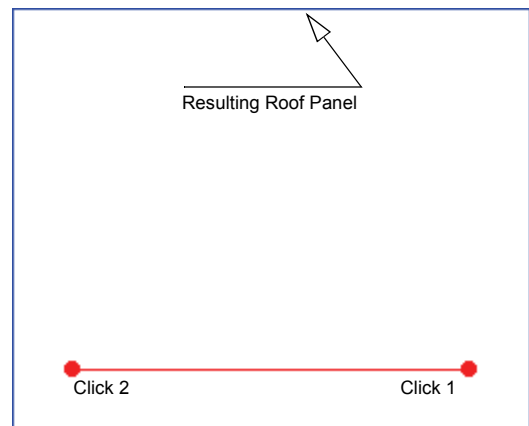


Figure 203.- Construction - Rectangular Roof Panel

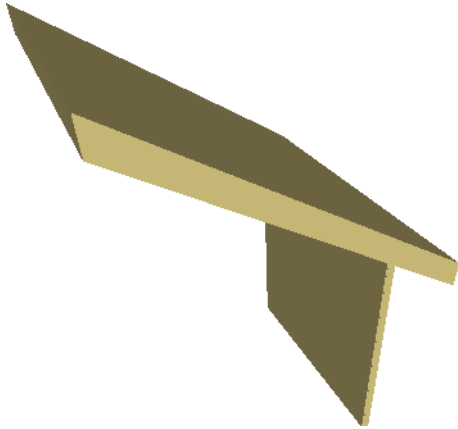


Figure 204.- Sample - Rectangular Roof Panel - I

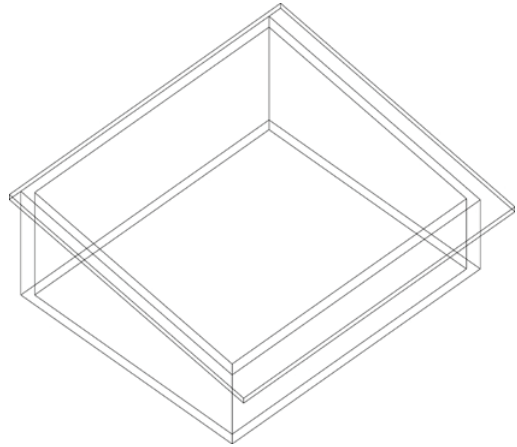


Figure 206.- Sample - Rectangular Roof Panel - III

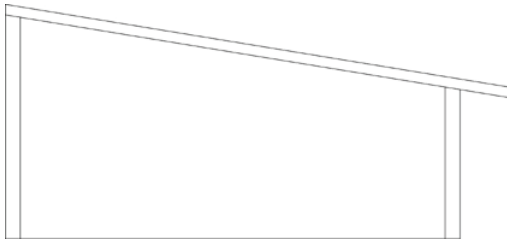


Figure 205.- Sample - Rectangular Roof Panel - II

Trapezoidal Roof Panel

This tool constructs a Flat or Pitched Trapezoidal Roof Panel along a construction vector



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 3D Model

To Construct a Trapezoidal Roof Panel:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.



3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Trapezoidal Roof Panel Parameters**, page 113)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the Vector that governs the construction of the roof

Note: The roof panel will be created to the Right of the construction Vector.



7. The Constructed Trapezoidal Roof Panel will appear drawn and selected.

Trapezoidal Roof Panel Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	
Small Edge Length	Free	Current Units
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Thickness	Free	Current Units
Lateral Roof Overhang	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

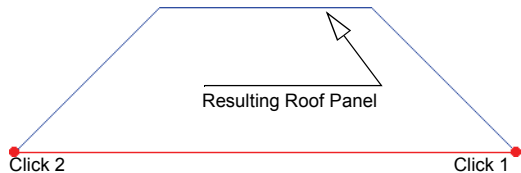


Figure 207.- Construction - Trapezoidal Roof Panel

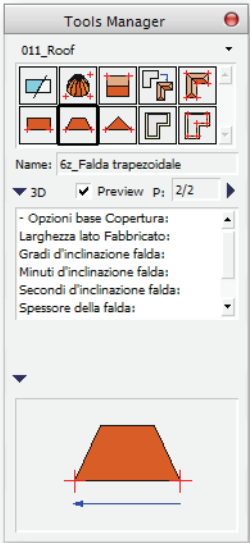


Figure 208.- Tool Manager - Trapezoidal Roof Panel

Triangular Roof Panel

This tool constructs a Flat or Pitched Triangular Roof Panel along a construction vector



Number of construction points: 2
Number of Construction Vectors: 1
Mode:3D Model

To Construct a Triangular Roof Panel:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Triangular Roof Panel Parameters**, page 113)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the Vector that governs the construction of the roof

Note: The roof panel will be created to the Right of the construction Vector.



7. The Constructed Triangular Roof Panel will appear drawn and selected.

Triangular Roof Panel Parameters

Parameter	Type	Description
Roof Edge Profile	Menu	

Triangular Roof Panel Parameters (Continued)

Parameter	Type	Description
Roof Pitch - Degrees	Free	Degrees
Roof Pitch - Minutes	Free	Minutes
Roof Pitch - Seconds	Free	Seconds
Roof Panel Thickness	Free	Current Units
Eave Overhang	Free	Current Units
Wall Top elevation	Free	Current Units

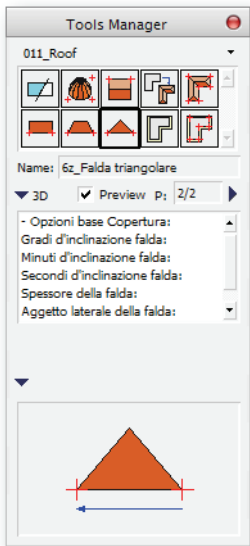


Figure 209.- Tool Manager - Triangular Roof Panel

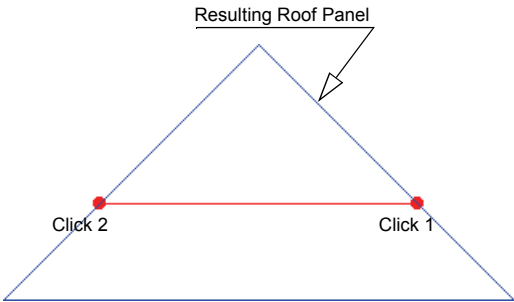


Figure 210.- Construction - Triangular Roof Panel

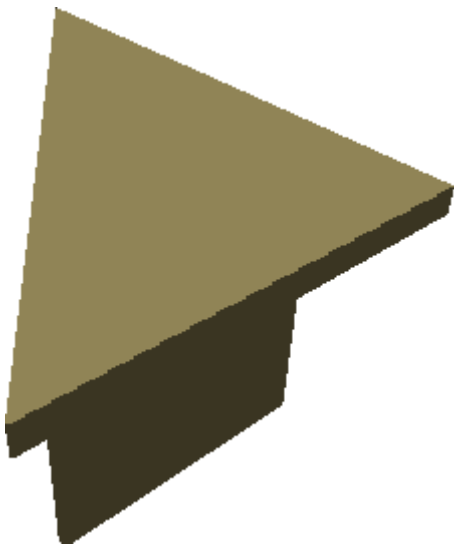


Figure 211.- Sample - Triangular Roof Panel

Rain Gutter from 2D

This tool constructs square or round cross-section rain gutter following a predefined open or closed 2D shape.



Number of construction points: None
Number of Construction Vectors: None
Mode:2D Draft

To Construct a Rain Gutter from 2D:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Rain Gutter from 2D Parameters**, page 115)
5. Select the 2D shape that will be used to draw the Gutter.
6. Select Insert in the right-hand menu in the tool manager.
7. The Constructed Rain Gutter from 2D will appear drawn and selected.

Rain Gutter from 2D Parameters

Parameter	Type	Description
Gutter Section	Menu	Round/Square
Eave Overhang	Free	Current Units
Number of Circular steps ^a	Free	Positive Integer 3-68
Gutter Width	Free	Current Units
Gutter Depth	Free	Current Units
Gutter Top Elevation	Free	Current Units

a. active only when "Gutter Section" is "Round"

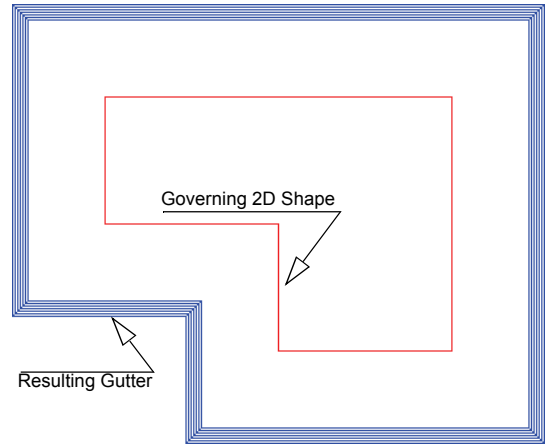


Figure 213.- Construction - Rain Gutter from 2D

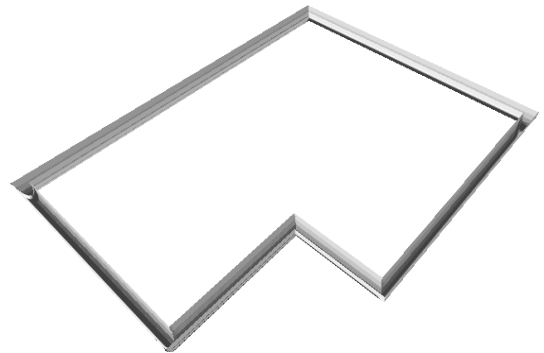


Figure 214.- Sample - Rain Gutter from 2D

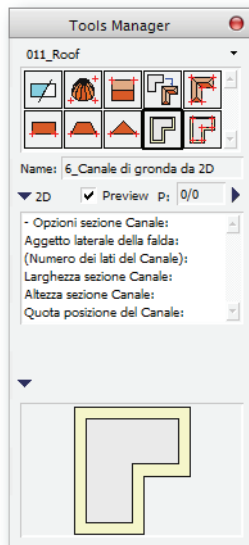


Figure 212.- Tool Manager - Rain Gutter from 2D

3D Polygonal Rain Gutter

This tool constructs square or round cross-section rain gutter along a polygonal path.

Number of construction points: 2-50
Number of Construction Vectors: 1-49
Mode:3D Model

To Construct a 3D Polygonal Rain Gutter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Roof Tools folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **3D Polygonal Rain Gutter Parameters**, page 116)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the Polygonal line that governs the construction of the gutter

Finish The Line with a double click on the last point.

7. The Constructed 3D Polygonal Rain Gutter will appear drawn and selected.

3D Polygonal Rain Gutter Parameters

Parameter	Type	Description
Gutter Section	Menu	Round/Square
Number of Circular steps ^a	Free	Positive Integer 3-68
Gutter Width	Free	Current Units
Gutter Depth	Free	Current Units
Gutter Top Elevation	Free	Current Units

a. active only when "Gutter Section" is "Round"

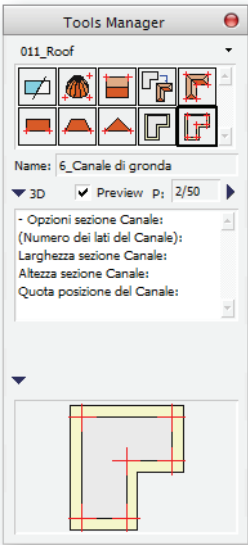


Figure 215.- Tool Manager - 3D Polygonal Rain Gutter

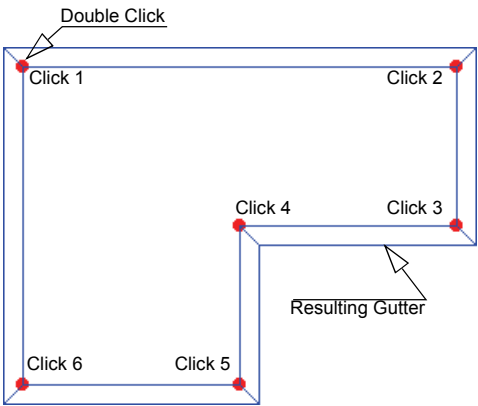


Figure 216.- Construction - 3D Polygonal Rain Gutter

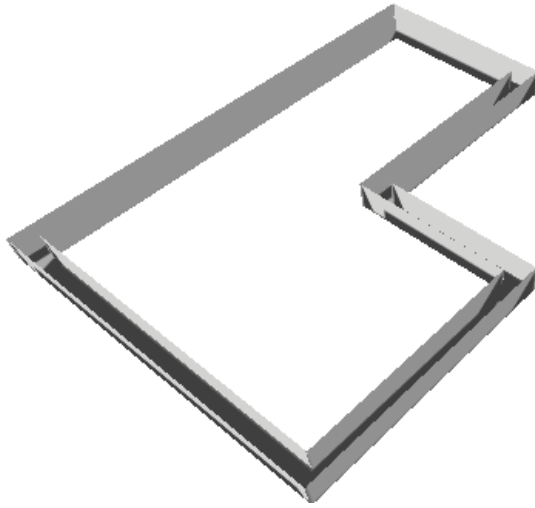


Figure 217.- Sample - 3D Polygonal Rain Gutter

Furniture - Office Furniture Tools

Holds tools and toolsets related to the construction of Office Furniture objects.



The following items are available in this toolset:

Furniture - Office Furniture Tools



Storage Tools

Holds tools and toolsets related to the construction of Storage Units for Office Furniture objects.



Front Panel Tools

Holds tools and toolsets related to the construction of Front Panels for Office Furniture objects.



Joining Kit Tools

Holds tools and toolsets related to the construction of Joining Hardware for Office Furniture objects.



Division Panel Tools

Holds tools and toolsets related to the construction of Division Panels for Office Furniture objects.



Counter Panel Tools

Holds tools and toolsets related to the construction of Surface Panels for Office Furniture objects.

Storage Tools

Holds tools and toolsets related to the construction of Storage Units for Office Furniture objects.



The following items are available in this toolset:

Storage Tools



File Cabinet

This tool constructs File Cabinets for Office Furniture Systems



2 Drawer File Cabinet

This tool constructs 2 Drawer File Cabinets for Office Furniture Systems



3 Drawer File Cabinet

This tool constructs 3 Drawer File Cabinets for Office Furniture Systems



4 Drawer Cabinet

This tool constructs 4 Drawer Cabinets for Office Furniture Systems



2 Drawer Hanging Cabinet

This tool constructs 2 Drawer Hanging Cabinets for Office Furniture Systems



1 Drawer Hanging Cabinet

This tool constructs 1 Drawer Hanging Cabinets for Office Furniture Systems



Hanging Cabinet

This tool constructs Hanging Cabinets for Office Furniture Systems



Drawer Cabinet

This tool constructs Drawer Cabinets for Office Furniture Systems



Paper Storage Cabinet

This tool constructs Paper Storage Cabinets for Office Furniture Systems



Shelf

This tool constructs Shelves for Office Furniture Systems

File Cabinet

This tool constructs File Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a File Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools
3. If necessary, double click on the Storage Tools folder.
4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **File Cabinet Parameters**, page 120)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required File Cabinet
8. Click to draw a vector that will define the orientation of the File Cabinet.
9. The Constructed File Cabinet will appear drawn and selected.

File Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

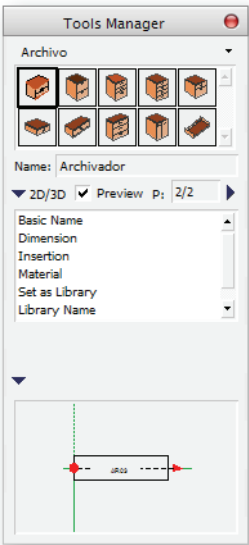


Figure 218.- Tool Manager - File Cabinet

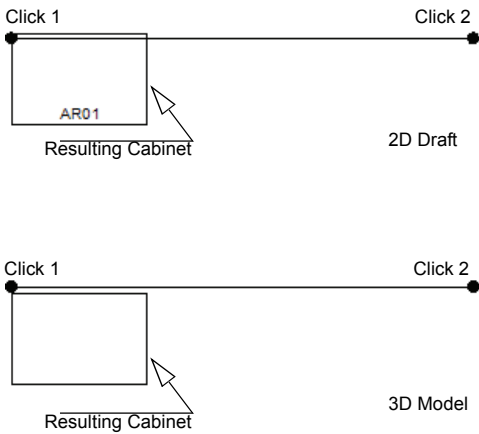


Figure 219.- Construction - File Cabinet

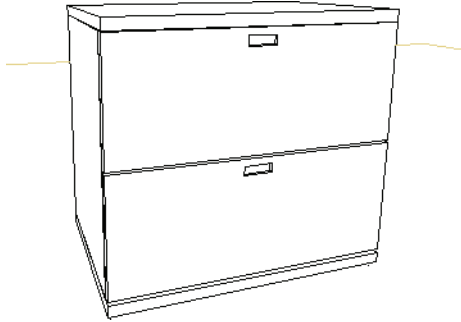


Figure 220.- Sample - File Cabinet - I



Figure 221.- Sample - File Cabinet - II




2 Drawer File Cabinet

This tool constructs 2 Drawer File Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a 2 Drawer File Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **2 Drawer File Cabinet Parameters**, page 121)
6. Select Insert in the right-hand menu in the tool manager.

7. click on the insertion point for the required 2 Drawer File Cabinet
8. Click to draw a vector that will define the orientation of the 2 Drawer File Cabinet.
9. The Constructed 2 Drawer File Cabinet will appear drawn and selected.

2 Drawer File Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

a. active only if "Set AS Library" is checked

b. active only if working in 2D draft mode

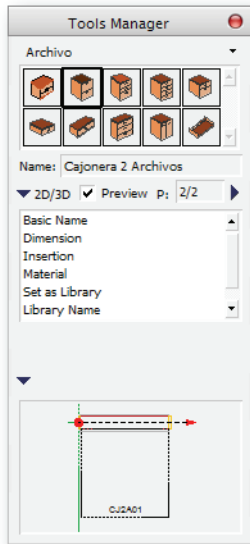


Figure 222.- Tool Manager - 2 Drawer File Cabinet

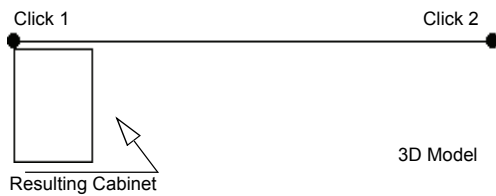
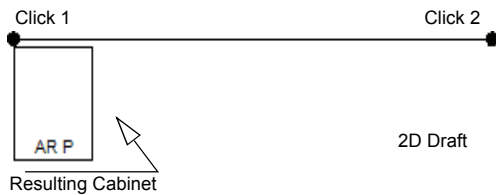


Figure 223.- Construction - 2 Drawer File Cabinet

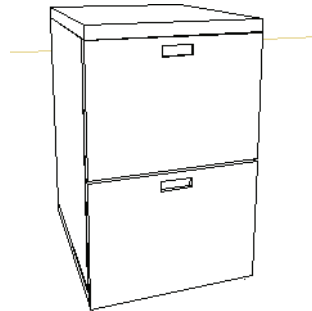


Figure 224.- Sample - 2 Drawer File Cabinet - I



Figure 225.- Sample - 2 Drawer File Cabinet - II




3 Drawer File Cabinet

This tool constructs 3 Drawer File Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a 3 Drawer File Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **3 Drawer File Cabinet Parameters**, page 123)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required 3 Drawer File Cabinet
8. Click to draw a vector that will define the orientation of the 3 Drawer File Cabinet.
9. The Constructed 3 Drawer File Cabinet will appear drawn and selected.

3 Drawer File Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

a. active only if "Set AS Library" is checked

b. active only if working in 2D draft mode

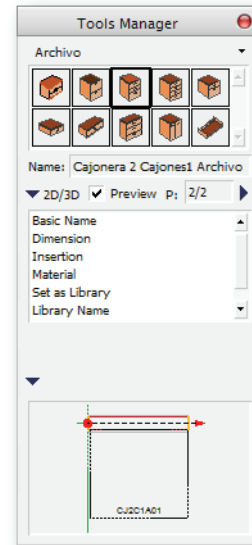


Figure 226.- Tool Manager - 3 Drawer File Cabinet

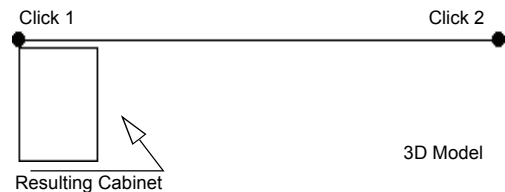
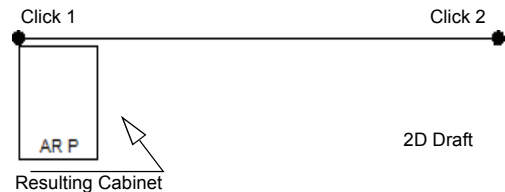


Figure 227.- Construction - 3 Drawer File Cabinet



Figure 228.- Sample - 3 Drawer File Cabinet - I



Figure 229.- Sample - 3 Drawer File Cabinet - II




4 Drawer Cabinet

This tool constructs 4 Drawer Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a 4 Drawer Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **4 Drawer Cabinet Parameters**, page 124)
6. Select Insert in the right-hand menu in the tool manager.

7. click on the insertion point for the required 4 Drawer Cabinet
8. Click to draw a vector that will define the orientation of the 4 Drawer Cabinet.
9. The Constructed 4 Drawer Cabinet will appear drawn and selected.

4 Drawer Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

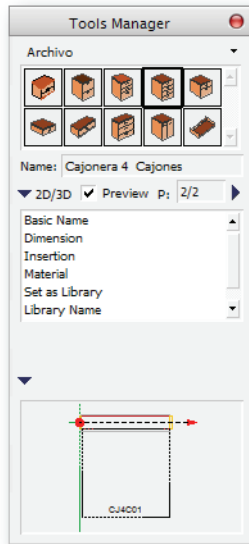


Figure 230.- Tool Manager - 4 Drawer Cabinet

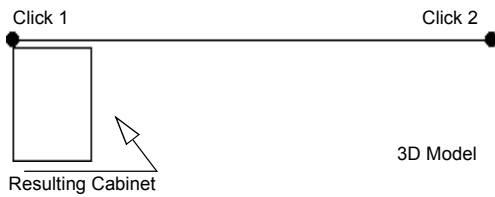
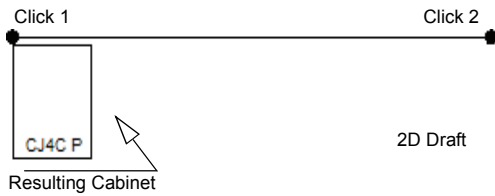


Figure 231.- Construction - 4 Drawer Cabinet

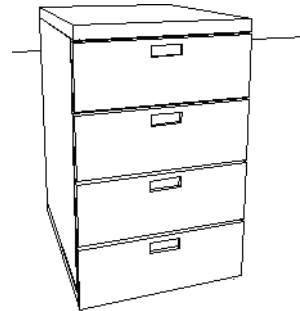


Figure 232.- Sample - 4 Drawer Cabinet - I



Figure 233.- Sample - 4 Drawer Cabinet - II




2 Drawer Hanging Cabinet

This tool constructs 2 Drawer Hanging Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a 2 Drawer Hanging Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **2 Drawer Hanging Cabinet Parameters**, page 126)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required 2 Drawer Hanging Cabinet
8. Click to draw a vector that will define the orientation of the 2 Drawer Hanging Cabinet.
9. The Constructed 2 Drawer Hanging Cabinet will appear drawn and selected.

2 Drawer Hanging Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

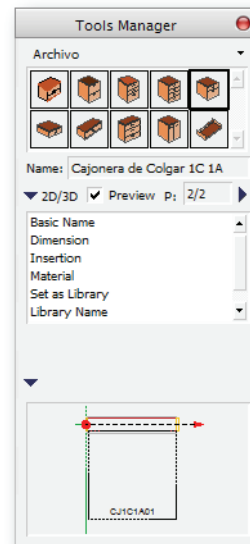


Figure 234.- Tool Manager - 2 Drawer Hanging Cabinet

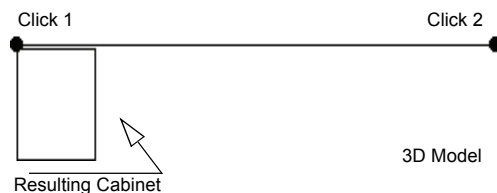


Figure 235.- Construction - 2 Drawer Hanging Cabinet!

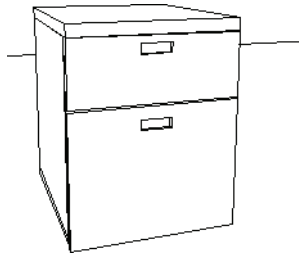


Figure 236.- Sample - 2 Drawer Hanging Cabinet - I



Figure 237.- Sample - 2 Drawer Hanging Cabinet - II




1 Drawer Hanging Cabinet

This tool constructs 1 Drawer Hanging Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a 1 Drawer Hanging Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **1 Drawer Hanging Cabinet Parameters**, page 127)

6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required 1 Drawer Hanging Cabinet
8. Click to draw a vector that will define the orientation of the 1 Drawer Hanging Cabinet.
9. The Constructed 1 Drawer Hanging Cabinet will appear drawn and selected.

1 Drawer Hanging Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

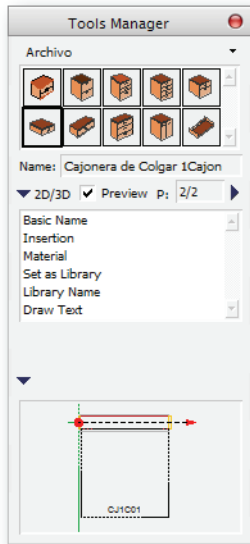


Figure 238.- Tool Manager - 1 Drawer Hanging Cabinet

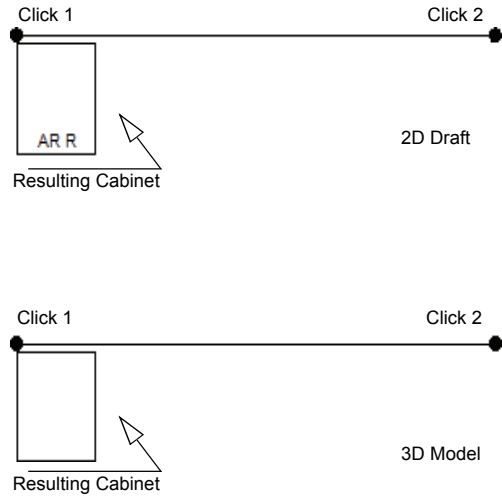


Figure 239.- Construction - 1 Drawer Hanging Cabinet/

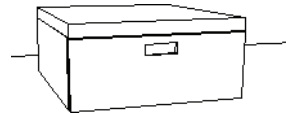


Figure 240.- Sample - 1 Drawer Hanging Cabinet - I

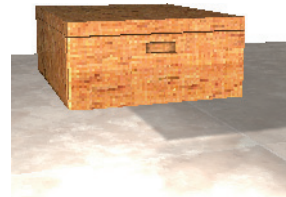


Figure 241.- Sample - 1 Drawer Hanging Cabinet - II

Hanging Cabinet

This tool constructs Hanging Cabinets for Office Furniture Systems





Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Hanging Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools



3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Hanging Cabinet Parameters**, page 129)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Hanging Cabinet
8. Click to draw a vector that will define the orientation of the Hanging Cabinet.
9. The Constructed Hanging Cabinet will appear drawn and selected.

Hanging Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Top Height	Menu	
Custom Top Height ^a	Free	Current Units
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No

a. active only if "Top Height" is set to "Custom"

b. active only if "Set AS Library" is checked

c. active only if working in 2D draft mode

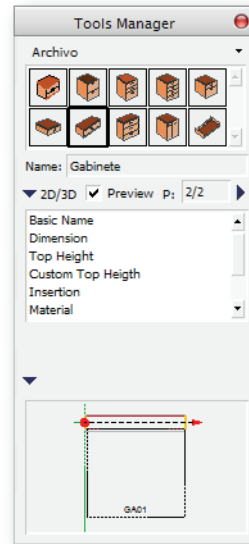


Figure 242.- Tool Manager - Hanging Cabinet

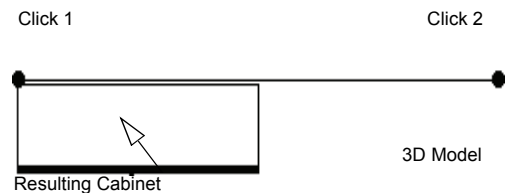
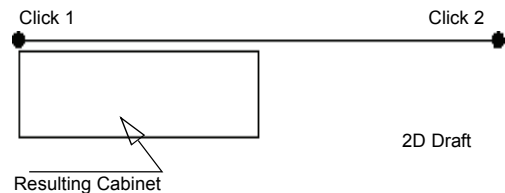


Figure 243.- Construction - Hanging Cabinet

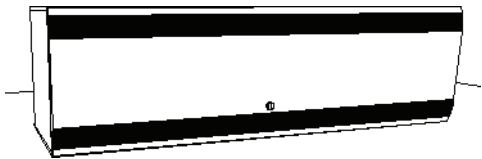


Figure 244.- Sample - Hanging Cabinet - I



Figure 245.- Sample - Hanging Cabinet - II




Drawer Cabinet

This tool constructs Drawer Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Drawer Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Drawer Cabinet Parameters**, page 130)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Drawer Cabinet

8. Click to draw a vector that will define the orientation of the Drawer Cabinet.
9. The Constructed Drawer Cabinet will appear drawn and selected.

Drawer Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Depth	Free	Current Units
Height ^a	Free	Current Units
Number of Drawers	Free	Positive Integer
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No
Offset	Free	Current Units

a. active only if "Top Height" is set to "Custom"

b. active only if "Set AS Library" is checked

c. active only if working in 2D draft mode

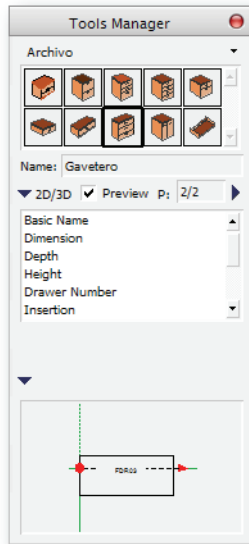


Figure 246.- Tool Manager - Drawer Cabinet

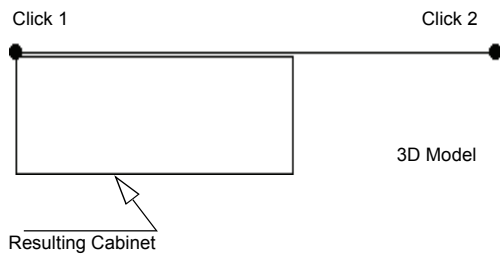
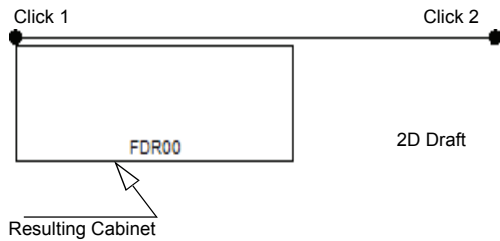


Figure 247.- Construction - Drawer Cabinet

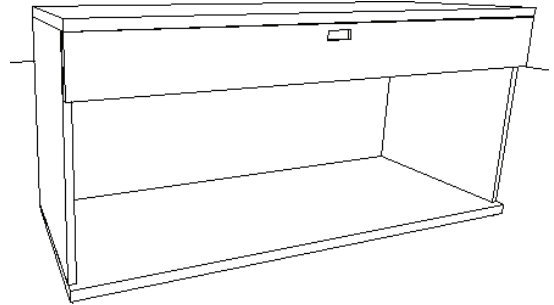


Figure 248.- Sample - Drawer Cabinet - I



Figure 249.- Sample - Drawer Cabinet - II




Paper Storage Cabinet

This tool constructs Paper Storage Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Paper Storage Cabinet:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Storage Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Paper Storage Cabinet Parameters**, page 132)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Paper Storage Cabinet
8. Click to draw a vector that will define the orientation of the Paper Storage Cabinet.
9. The Constructed Paper Storage Cabinet will appear drawn and selected.

Paper Storage Cabinet Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Custom Depth ^a	Free	Current Units

Paper Storage Cabinet Parameters (Continued)

Parameter	Type	Description
Custom Height ^b	Free	Current Units
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^c	Menu	
Draw Object Text ^d	Boolean	Yes/No

- a. active only if "Top Height" is set to "Custom"
- b. active only if "Top Height" is set to "Custom"
- c. active only if "Set AS Library" is checked
- d. active only if working in 2D draft mode

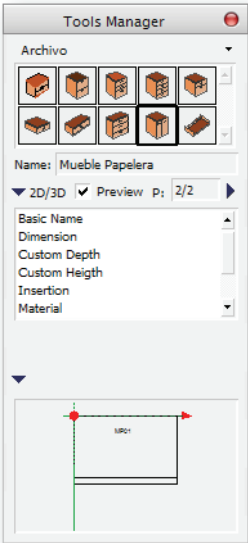


Figure 250.- Tool Manager - Paper Storage Cabinet

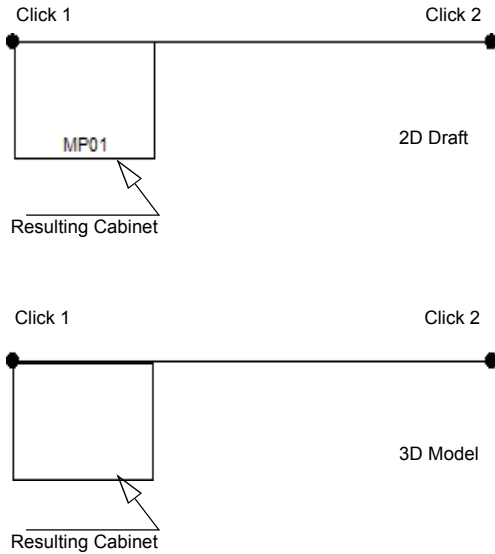


Figure 251.- Construction - Paper Storage CabinetI

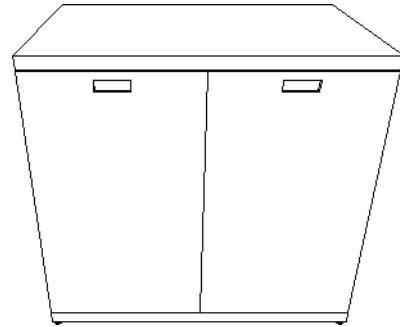


Figure 252.- Sample - Paper Storage Cabinet - I



Figure 253.- Sample - Paper Storage Cabinet - II

Shelf

This tool constructs Paper Storage Cabinets for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Shelf:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools



3. If necessary, double click on the Storage Tools folder.



4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **Shelf Parameters**, page 134)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Shelf



- 8. Click to draw a vector that will define the orientation of the Shelf.
- 9. The Constructed Shelf will appear drawn and selected.

Shelf Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Top Height	Menu	
Custom Top Height ^a	Free	Current Units
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No

- a. active only if "Top Height" is set to "Custom"
- b. active only if "Set AS Library" is checked
- c. active only if working in 2D draft mode

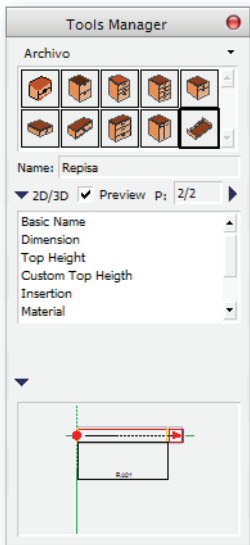


Figure 254.- Tool Manager - Shelf

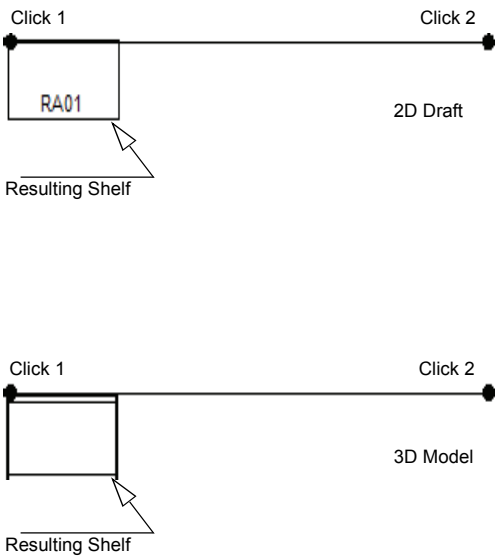


Figure 255.- Construction - Shelf

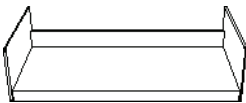


Figure 256.- Sample - Shelf - I

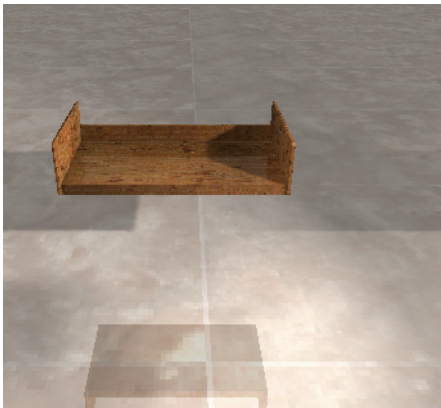


Figure 257.- Sample - Shelf - II

Front Panel Tools

Holds tools and toolsets related to the construction of Front Panels for Office Furniture objects.



The following items are available in this toolset:

Front Panel Tools



Desk Front Panel

This tool constructs Desk Front Panels for Office Furniture Systems



Pedestal

This tool constructs Desk or Surface Pedestals for Office Furniture Systems




Desk Front Panel

This tool constructs Desk Front Panels for Office Furniture Systems



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Desk Front Panel:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Front Panel Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Desk Front Panel**, page 135)
6. Select Insert in the right-hand menu in the tool manager.

7. click on the insertion point for the required Desk Front Panel
8. Click to draw a vector that will define the orientation of the Desk Front Panel.
9. The Constructed Desk Front Panel will appear drawn and selected.

Desk Front Panel Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

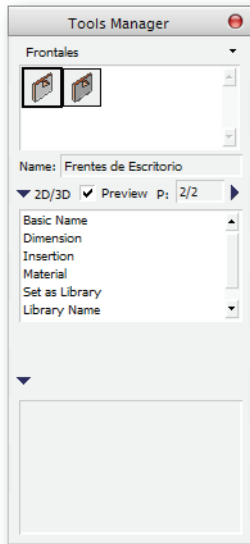


Figure 258.- Tool Manager - Desk Front Panel

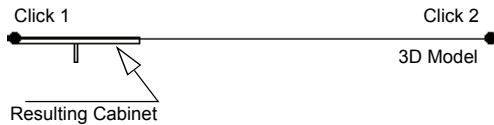


Figure 259.- Construction - Desk Front Panell

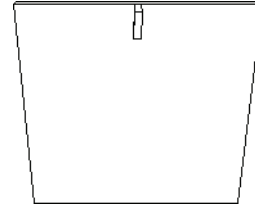


Figure 260.- Sample - Desk Front Panel - I

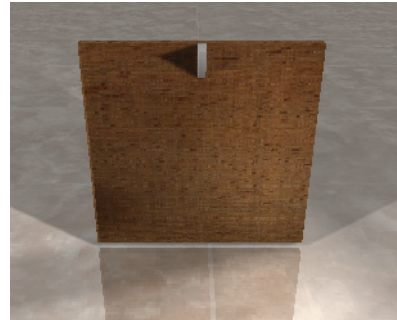


Figure 261.- Sample - Desk Front Panel - II

Pedestal




This tool constructs Desk or Surface Pedestals for Office Furniture Systems

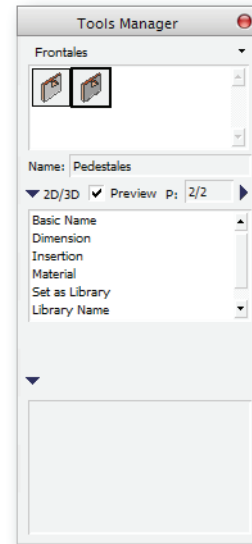


Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Pedestal:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Front Panel Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Pedestal**, page 136)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Pedestal
8. Click to draw a vector that will define the orientation of the Pedestal.
9. The Constructed Pedestal will appear drawn and selected.



Pedestal Parameters

Parameter	Type	Description
Basic Name	Free	
Dimensions	Menu	
Insertion	Menu	
Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode



Figure 262.- Sample - Pedestal - IIPedestalPedestal

Figure 263.- Tool Manager - Pedestal

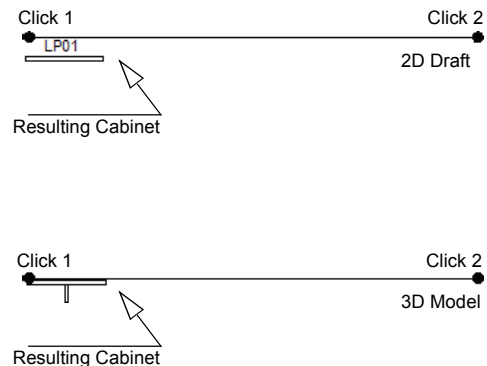


Figure 264.- Construction - Pedestal

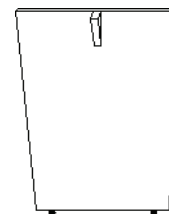


Figure 265.- Sample - Pedestal - I

Joining Kit Tools

Holds tools and toolsets related to the construction of Joining Hardware for Office Furniture objects.



The following items are available in this toolset:

Joining Kit Tools



Joining Kit

This tool constructs Joining Kits for Office Furniture Systems.




Joining Kit

This tool constructs Joining Kits for Office Furniture Systems.



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Joining Kit:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Joining Kit Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Joining Kit Parameters**, page 138)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Joining Kit

8. Click to draw a vector that will define the orientation of the Joining Kit.
9. The Constructed Joining Kit will appear drawn and selected.

Joining Kit Parameters

Parameter	Type	Description
Basic Name	Free	
Kit Type	Menu	
Height	Menu	
Custom Height ^a	Free	Current Units
Depth	Menu	
Custom Depth ^b	Free	Current Units
Material	Menu	
Accessories' Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^c	Menu	
Draw Object Text ^d	Boolean	Yes/No

a. active only if "Height" is set to "Custom"

b. active only if "Depth" is set to "Custom"

c. active only if "Set AS Library" is checked

d. active only if working in 2D draft mode

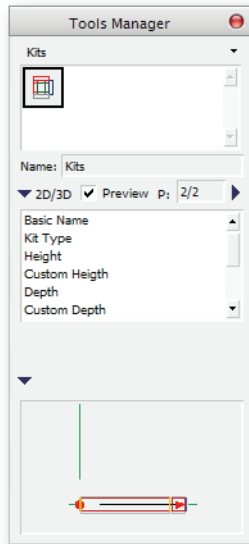


Figure 266.- Tool Manager - Joining Kit

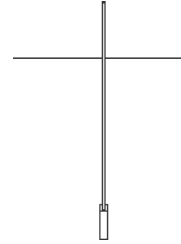


Figure 267.- Sample - Joining Kit - I



Figure 268.- Sample - Joining Kit - II

Division Panel Tools

Holds tools and toolsets related to the construction of Division Panels for Office Furniture objects.



The following items are available in this toolset:

Division Panel Tools



Door Division Panel

This tool constructs Division Panels with doors for Office Furniture Systems.



Division Panel

This tool constructs Division Panels for Office Furniture Systems.




Door Division Panel

This tool constructs Door Division Panels for Office Furniture Systems.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:2D Draft/3D Model

To Construct a Door Division Panel:

1. If the Tool Manager is not visible, select Windows > Tool Manager.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Division Panel Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Door Division Panel Parameters**, page 140)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Door Division Panel

8. Click to draw a vector that will define the orientation of the Door Division Panel.
9. Click to set the direction the panel door will open.
10. The Constructed Door Division Panel will appear drawn and selected.

Door Division Panel Parameters

Parameter	Type	Description
Basic Name	Free	
Width	Menu	
Angle	Menu	
Insertion	Menu	
Frame Material	Menu	
Door Material	Menu	
Stop Material	Menu	
Door Pane Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

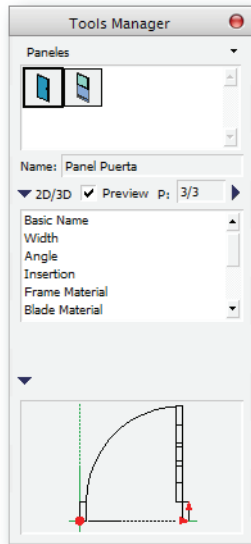


Figure 269.- Tool Manager - Door Division Panel

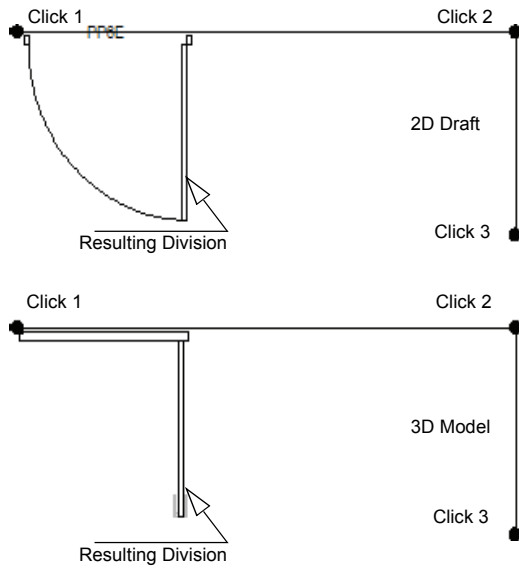


Figure 270.- Construction - Door Division Panel

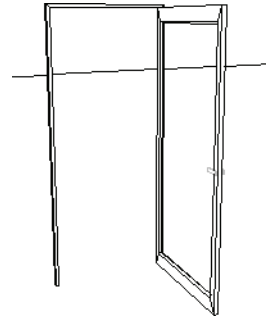


Figure 271.- Sample - Door Division Panel - I



Figure 272.- Sample - Door Division Panel - II

Division Panel

This tool constructs Division Panels for Office Furniture Systems.



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Division Panel:

1. If the Tool Manager is not visible, select Windows > Tool Manager.
2. If necessary, double click on the Furniture - Office Furniture Tools
3. If necessary, double click on the Division Panel Tools folder.
4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **Division Panel Parameters**, page 142)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Division Panel
8. Click to draw a vector that will define the orientation of the Division Panel.
9. The Constructed Division Panel will appear drawn and selected.



Division Panel Parameters

Parameter	Type	Description
Basic Name	Free	
Panel Type	Menu	
Height	Menu	
Custom Height ^a	Free	Current Units
Width	Menu	

Division Panel Parameters (Continued)

Parameter	Type	Description
Depth	Free	Current Units
Stop Material	Menu	
Initial Kit	Menu	
Final Kit	Menu	
Material	Menu	
Accessories Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No

- a. active only if "Height" is set to "Custom"
b. active only if "Set AS Library" is checked
c. active only if working in 2D draft mode

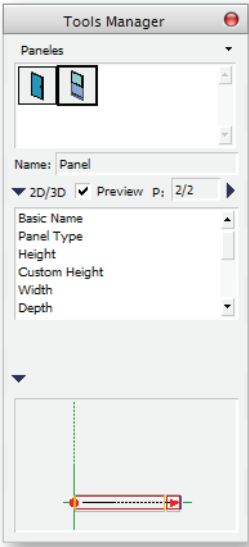


Figure 273.- Tool Manager - Division Panel

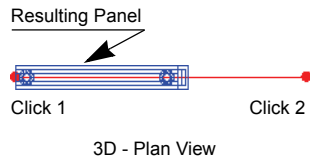
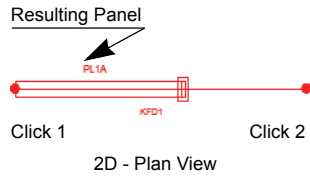


Figure 274.- Construction - Division Panels

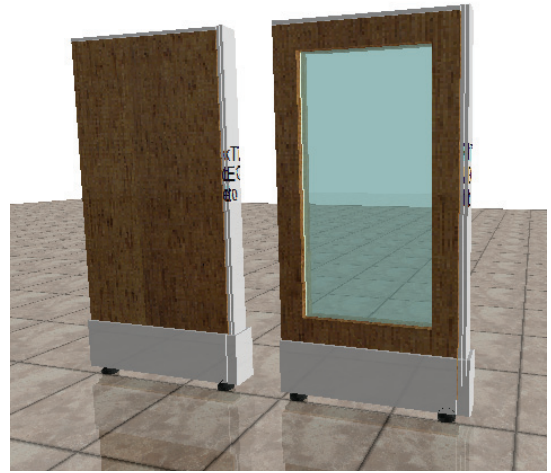


Figure 275.- Sample - Division Panels

Counter Panel Tools

Holds tools and toolsets related to the construction of Division Panels for Office Furniture objects.



The following items are available in this toolset:

Counter Panel Tools



Central Counter

This tool constructs central counter modules for the Office Furniture System



Curved Corner Counter

This tool constructs Curved Corner Counter modules for the Office Furniture System



Double Extensible Counter

This tool constructs Double Extensible Counter modules for the Office Furniture System



Straight Corner Counter

This tool constructs Straight Corner Counter modules for the Office Furniture System



Half-Round Counter

This tool constructs Half-Round Counter modules for the Office Furniture System



Straight Counter

This tool constructs Straight Counter modules for the Office Furniture System

Central Counter

This tool constructs Central Counters for Office Furniture Systems.



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Central Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools



3. If necessary, double click on the Counter Panel Tools folder.



4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **Central Counter Parameters**, page 145)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Central Counter



8. Click to draw a vector that will define the orientation of the Central Counter.
9. The Constructed Central Counter will appear drawn and selected.

Central Counter Parameters

Parameter	Type	Description
Basic Name	Free	
Dimension	Menu	
Base Height	Menu	
Custom Height ^a	Free	Current Units
Insertion	Menu	
Material	Menu	
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No

- a. active only if "Base Height" is set to "Custom"
- b. active only if "Set AS Library" is checked
- c. active only if working in 2D draft mode

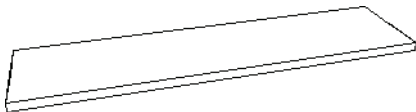


Figure 276.- Sample - Central Counter - I



Figure 277.- Sample - Central Counter - II

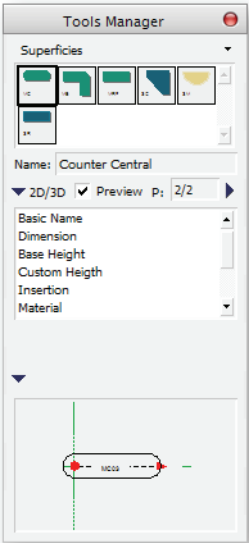


Figure 278.- Tool Manager - Central Counter

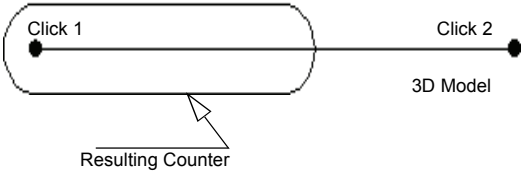
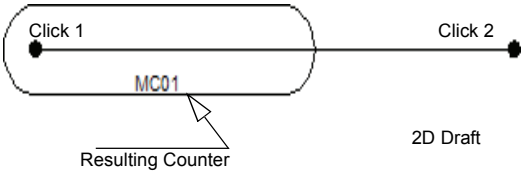


Figure 279.- Construction - Central Counter




Curved Corner Counter

This tool constructs Curved Corner Counter modules for the Office Furniture System



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Curved Corner Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Counter Panel Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Curved Corner Counter Parameters**, page 146)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Curved Corner Counter
8. Click to draw a vector that will define the orientation of the Curved Corner Counter.
9. The Constructed Curved Corner Counter will appear drawn and selected.

Curved Corner Counter Parameters

Parameter	Type	Description
Basic Name	Free	
Dimension	Menu	
Custom Depth ^a	Free	Current Units

Curved Corner Counter Parameters (Continued)

Parameter	Type	Description
Base Height	Menu	
Custom Height ^b	Free	Current Units
Insertion	Menu	
Material	Menu	
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^c	Menu	
Draw Object Text ^d	Boolean	Yes/No

- a. active only if "Dimension is set to "Custom"
b. active only if "Base Height" is set to "Custom"
c. active only if "Set AS Library" is checked
d. active only if working in 2D draft mode

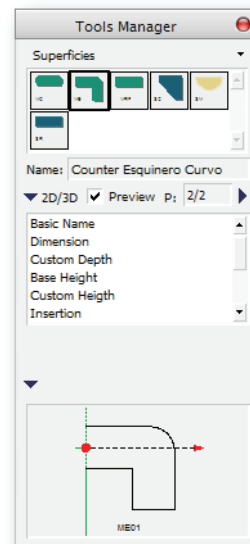


Figure 280.- Tool Manager - Curved Corner Counter

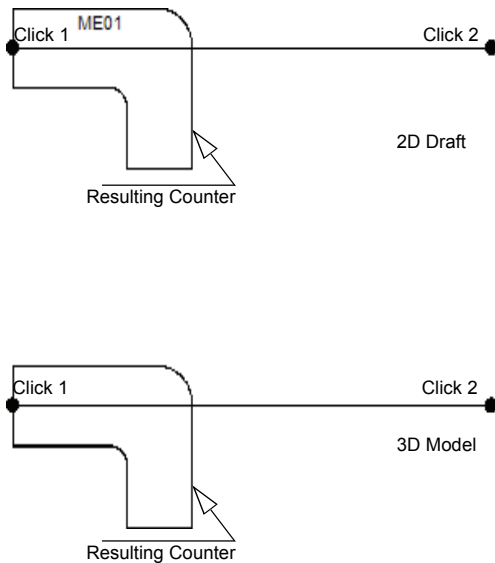


Figure 281.- Construction - Curved Corner Counter



Figure 282.- Sample - Curved Corner Counter - I

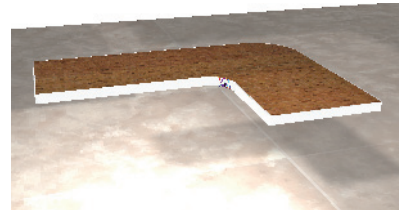


Figure 283.- Sample - Curved Corner Counter - II




Double Extensible Counter

This tool constructs Double Extensible Counter modules for the Office Furniture System



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Double Extensible Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools 
3. If necessary, double click on the Counter Panel Tools folder. 
4. Select (click) the tool's icon. 
5. Select and modify any required parameter from the tool's parameter list (See **Double Extensible Counter Parameters**, page 147)

6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Double Extensible Counter
8. Click to draw a vector that will define the orientation of the Double Extensible Counter.
9. The Constructed Double Extensible Counter will appear drawn and selected.

Double Extensible Counter Parameters

Parameter	Type	Description
Basic Name	Free	
Dimension	Menu	
Custom Depth ^a	Free	Current Units
Top Height	Menu	
Custom Height ^b	Free	Current Units
Insertion	Menu	
Material	Menu	

Double Extensible Counter Parameters

Parameter	Type	Description
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^c	Menu	
Draw Object Text ^d	Boolean	Yes/No

- a. active only if "Dimension is set to "Custom"
- b. active only if "Top Height" is set to "Custom"
- c. active only if "Set AS Library" is checked
- d. active only if working in 2D draft mode

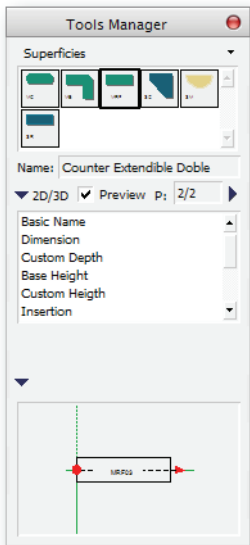


Figure 284.- Tool Manager - Double Extensible Counter

Straight Corner Counter

This tool constructs Straight Corner Counter modules for the Office Furniture System



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

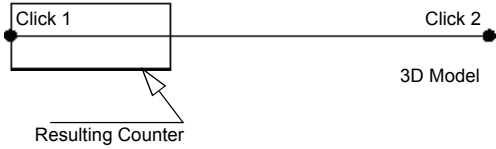


Figure 285.- Construction - Double Extensible Counter

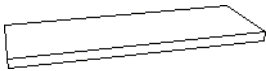


Figure 286.- Sample - Double Extensible Counter - I



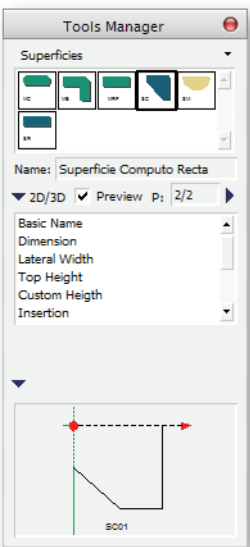
Figure 287.- Sample - Double Extensible Counter - II

To Construct a Straight Corner Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools



3. If necessary, double click on the Counter Panel Tools folder.
4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **Straight Corner Counter Parameters**, page 149)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Straight Corner Counter
8. Click to draw a vector that will define the orientation of the Straight Corner Counter.
9. The Constructed Straight Corner Counter will appear drawn and selected.



Straight Corner Counter Parameters

Parameter	Type	Description
Basic Name	Free	
Dimension	Menu	
Lateral Width	Free	Current Units
Top Height	Menu	
Custom Height ^a	Free	Current Units
Insertion	Menu	
Material	Menu	
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^b	Menu	
Draw Object Text ^c	Boolean	Yes/No

- a. active only if "Top Height" is set to "Custom"
b. active only if "Set AS Library" is checked
c. active only if working in 2D draft mode



Figure 288.- Sample - Straight Corner Counter - I

Figure 289.- Tool Manager - Straight Corner Counter

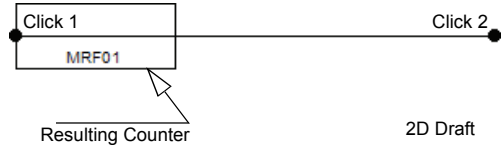


Figure 290.- Construction - Straight Corner Counter



Figure 291.- Sample - Straight Corner Counter - II

Half-Round Counter

This tool constructs Half-Round Counter modules for the Office Furniture System



Number of construction points: 2
Number of Construction Vectors: 1
Mode:2D Draft/3D Model

To Construct a Half-Round Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools
3. If necessary, double click on the Counter Panel Tools folder.
4. Select (click) the tool's icon.
5. Select and modify any required parameter from the tool's parameter list (See **Half-Round Counter Parameters**, page 150)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Half-Round Counter
8. Click to draw a vector that will define the orientation of the Half-Round Counter.
9. The Constructed Half-Round Counter will appear drawn and selected.



Half-Round Counter Parameters

Parameter	Type	Description
Basic Name	Free	
Dimension	Menu	

Half-Round Counter Parameters (Continued)

Parameter	Type	Description
Base Type	Menu	
Insertion	Menu	
Material	Menu	
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^a	Menu	
Draw Object Text ^b	Boolean	Yes/No

- a. active only if "Set AS Library" is checked
b. active only if working in 2D draft mode

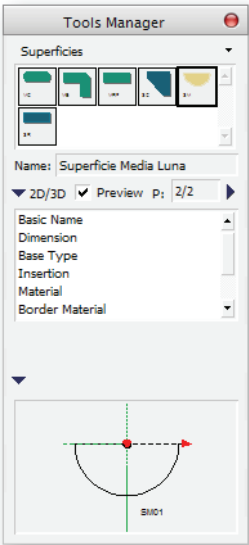


Figure 292.- Tool Manager - Half-Round Counter

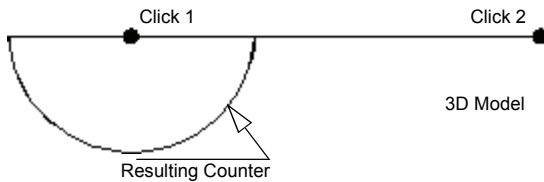
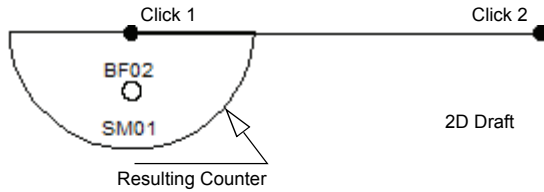


Figure 293.- Construction - Half-Round Counter

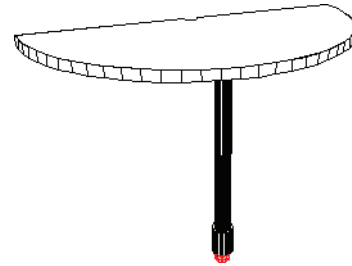


Figure 294.- Sample - Half-Round Counter - I



Figure 295.- Sample - Half-Round Counter - I

Straight Counter

This tool constructs Straight Counter modules for the Office Furniture System



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Construct a Straight Counter:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the Furniture - Office Furniture Tools
3. If necessary, double click on the Counter Panel Tools folder.
4. Select (click) the tool's icon.



5. Select and modify any required parameter from the tool's parameter list (See **Straight Counter Parameters**, page 151)
6. Select Insert in the right-hand menu in the tool manager.
7. click on the insertion point for the required Straight Counter
8. Click to draw a vector that will define the orientation of the Straight Counter.
9. The Constructed Straight Counter will appear drawn and selected.

Straight Counter Parameters

Parameter	Type	Description
Basic Name	Free	

Straight Counter Parameters (Continued)

Parameter	Type	Description
Dimension	Menu	
Custom Depth ^a	Free	Current Units
Base Height	Menu	
Custom Height ^b	Free	Current Units
Insertion	Menu	
Material	Menu	
Border Material	Menu	
Set as Library	Boolean	Yes/No
Library Name ^c	Menu	
Draw Object Text ^d	Boolean	Yes/No

- a. active only if "Dimension" is set to "Custom"
- b. active only if "Base Height" is set to "Custom"
- c. active only if "Set AS Library" is checked
- d. active only if working in 2D draft mode

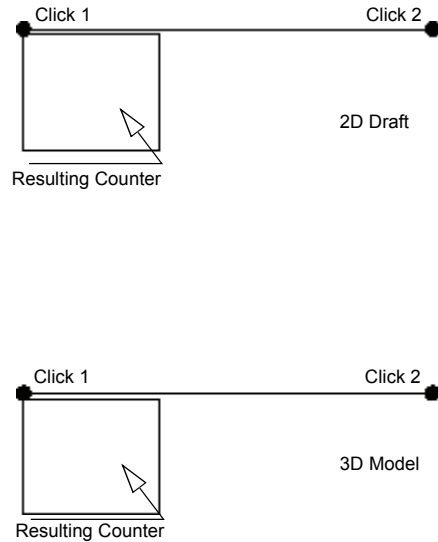


Figure 297.- Construction - Straight Counter

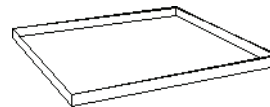


Figure 298.- Sample - Straight Counter - I



Figure 299.- Sample - Straight Counter - II

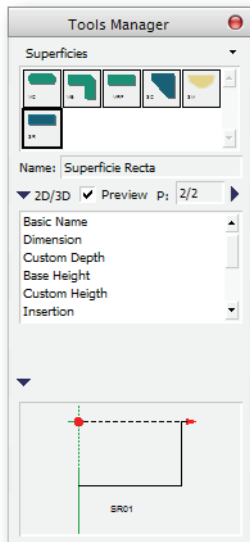


Figure 296.- Tool Manager - Straight Counter

DCAD VectorSpace Commands

Holds tools and toolsets related to DCAD VectorSpace Commands.



The following items are available in this toolset:

DCAD VectorSpace Commands



Object to Library

This tool assigns library parameters (Name, Type and Insertion point) to selected 2D objects or object groups



Line to Fill

This tool ...



Tile 2D Vector Fill [I]

This tool...



Tile 2D Vector Fill [II]

This tool...



Name Object

This tool assigns names from a predefined list to any selected 2D/3D object.



2D Offset

This tool offsets 2D shapes creating full surface or ring-like 2D shapes



Grid Array

This tool constructs and array of 2D or 3D objects distributed on the intersections of a quadrangle grid defined by two construction vectors.



Polygonal Array

This tool constructs and array of 2D or 3D objects distributed on the constructions points of an open polygonal



Change Base Elevation

This tool changes the Base Elevation of 3D objects by a certain amount.



Change Object Height

This tool changes the Height of 3D objects by a certain amount.



Move & Scale 2D Object

This tool moves and scales 2D objects

DCAD VectorSpace Commands



Rotate Object

This tool rotates 2D and 3D objects by a given amount.



Cut 3D Object

This tool executes boolean cut operations on 3D objects



Polar Array

This tool constructs and array of 2D or 3D objects distributed around a set rotation axis.



Object to Library


This tool assigns library parameters (Name, Type and Insertion point) to selected 2D objects or object groups



Number of construction points: 1
Number of Construction Vectors: 0
Mode:2D Draft

To Convert an Object to Library:

1. If the Tool Manager is not visible, select **Win-dows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Object to Library Parameters**, page 154)
5. Select the 2D object to convert.
6. Select Insert in the right-hand menu in the tool manager.
7. Click at the position of the intended insertion point for the resulting Library Object.

Note: If "Insertion Point Options" is set to "XY Coordinates", the click can be done anywhere since the insertion point will be positioned by the values indicated in the next two parameters. 

8. The Object will be converted to a 2D Library Object.

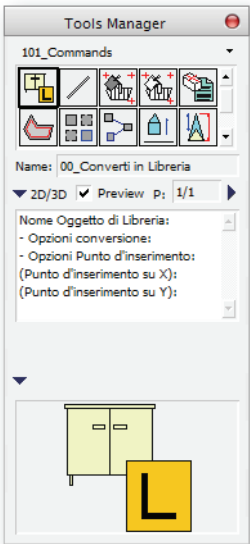


Figure 300.- Tool Manager - Object to Library

Object to Library Parameters

Parameter	Type	Description
Object Name	Free	
Conversion Options	Menu	Library/Punch Object

Object to Library Parameters (Continued)

Parameter	Type	Description
Insertion Point Options	Menu	Click-point/XY Coordinates
Insertion Point X Value ^a	Free	Current Units
Insertion Point y Value ^b	Free	Current Units

- a. active only if "Insertion Point Options" is set to XY Coordinates
b. active only if "Insertion Point Options" is set to XY Coordinates



Line to Fill

This tool...

Number of construction points: 0
Number of Construction Vectors: 0
Mode:2D Draft



To Convert Line to Fill:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Line to Fill Parameters**, page 155)
5. Select the 2D object to...
6. Select Insert in the right-hand menu in the tool manager.
7. The Object will be...

Line to Fill Parameters

Parameter	Type	Description
None		

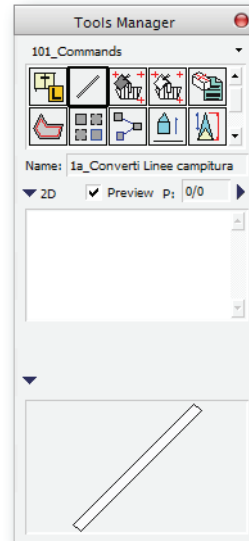


Figure 301.- Tool Manager - Line to Fill



Tile 2D Vector Fill [I]

This tool...

Number of construction points: -3
Number of Construction Vectors: 2
Mode:2D Draft



To Tile 2D Vector Fill [I]:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Tile 2D Vector Fill [I] Parameters**, page 156)
5. Select the 2D object to...
6. Select Insert in the right-hand menu in the tool manager.
7. Draw the construction vectors.
8. The Object will be...

Tile 2D Vector Fill [I] Parameters

Parameter	Type	Description
Convert Fill to 3D	Boolean	Yes/No

Tile 2D Vector Fill [I] Parameters (Continued)

Parameter	Type	Description
Horizontal Fill Spacing	Free	Current Units
Vertical Fill Spacing	Free	Current Units

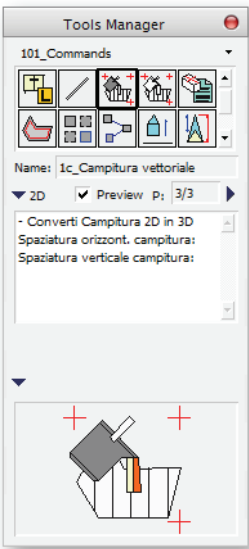


Figure 302.- Tool Manager - Tile 2D Vector Fill [I]

Tile 2D Vector Fill [II]



This tool...

Number of construction points: 3
Number of Construction Vectors: 3
Mode:2D Draft



To Tile 2D Vector Fill [II]:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Tile 2D Vector Fill [II] Parameters**, page 157)
5. Select the 2D object to...

6. Select Insert in the right-hand menu in the tool manager.
7. Draw the construction vectors.
8. The Object will be...

Tile 2D Vector Fill [II] Parameters

Parameter	Type	Description
Convert Fill to 3D	Boolean	Yes/No

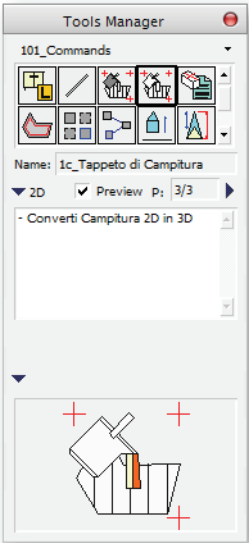


Figure 303.- Tool Manager - Tile 2D Vector Fill [II]

Name Object

This tool assigns names from a predefined list to any selected 2D/3D object.



Number of construction points: 0
 Number of Construction Vectors: 0
 Mode:2D Draft/3D Model

To Name Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder
3. Select (click) the tool’s icon.



4. Select and modify any required parameter from the tool’s parameter list (See **Name Object Parameters**, page 157)
5. Select the 2D object to name
6. Select Insert in the right-hand menu in the tool manager.
7. The Object will be named

Name Object Parameters

Parameter	Type	Description
Object Name	Menu	
Custom Object Name ^a	Free	

a. active only if “Object Name” is set to “Custom”

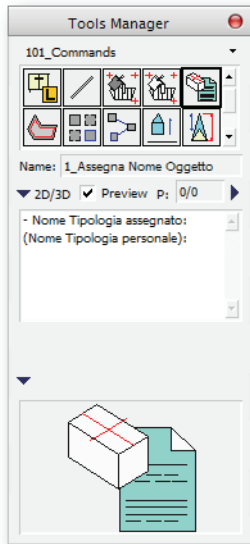


Figure 304.- Tool Manager - Name Object



2D Offset

This tool offsets 2D shapes creating full surface or ring-like 2D shapes



Number of construction points: 2
Number of Construction Vectors: 1
Mode: 2D Draft/3D Model

To Offset a 2D Shape:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **2D Offset Parameters**, page 158)

5. Select the 2D shape to be offset.
6. Select Insert in the right-hand menu in the tool manager.
7. The Offset 2D Shape will appear drawn and selected.

2D Offset Parameters

Parameter	Type	Description
Type of 2D Shape	Menu	Polygon/Line
Offset Options	Menu	
Offset Direction	Menu	Outside/Inside
Offset Value	Free	Current Units
Number of Copies ^a	Free	Current Units

a. active only if selected shape is closed

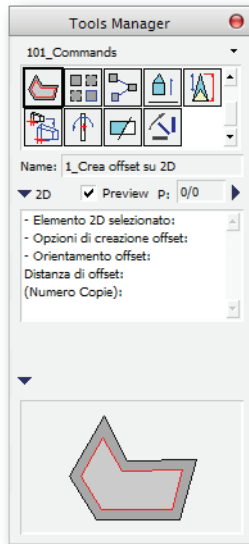


Figure 305.- Tool Manager - 2D Offset

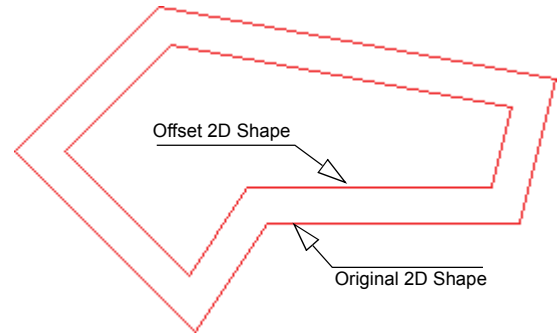


Figure 306.- Sample - 2D Offset - I

Grid Array

This tool constructs an array of 2D or 3D objects distributed on the intersections of a quadrangle grid defined by two construction vectors.



The grid may be irregular in both the construction vector lengths and the angle between them.

Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model

To Construct a Grid Array:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Grid Array Parameters**, page 159)
5. Select the one or more objects to place in the grid
6. Select Insert in the right-hand menu in the tool manager.
7. Draw the construction vectors.
8. The Grid Array will appear drawn and selected.



Grid Array Parameters

Parameter	Type	Description
Number of copies along first vector	Free	Positive Integer
Number of copies along second vector	Free	Positive Integer

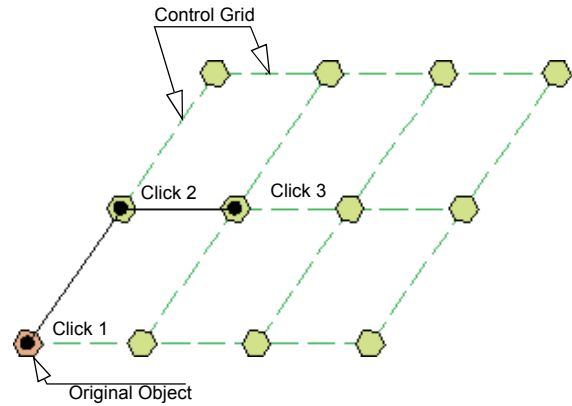
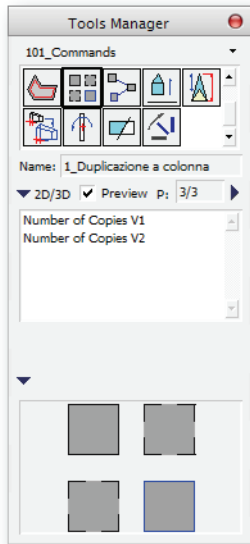


Figure 308.- Construction - Grid Array

Figure 307.- Tool Manager - Grid Array

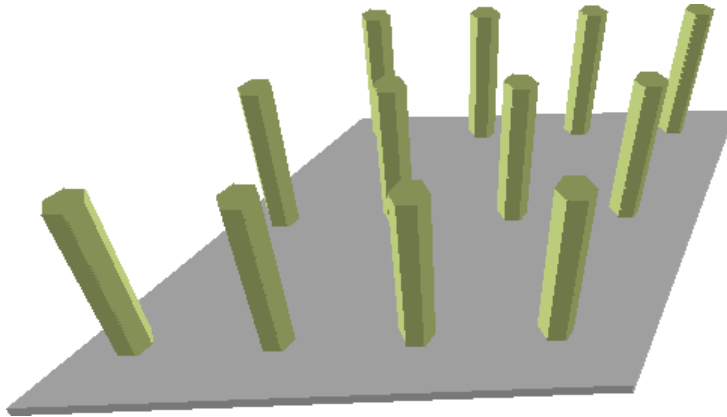


Figure 309.- Sample - Grid Array

Polygonal Array



This tool constructs an array of 2D or 3D objects distributed on the constructions



points of an open polygonal

Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode: 2D Draft/3D Model

To Construct a Polygonal Array:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Polygonal Array Parameters**, page 161)
5. Select the one or more objects to place in the grid
6. Select Insert on the palette's right-hand menu.
7. Click on the points designated to place the selected shapes.

Note: Double click to stop placing objects.

8. The Polygonal Array will appear drawn and selected. 

Polygonal Array Parameters

Parameter	Type	Description
None		

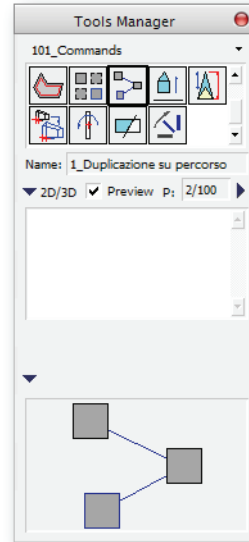


Figure 310.- Tool Manager - Polygonal Array

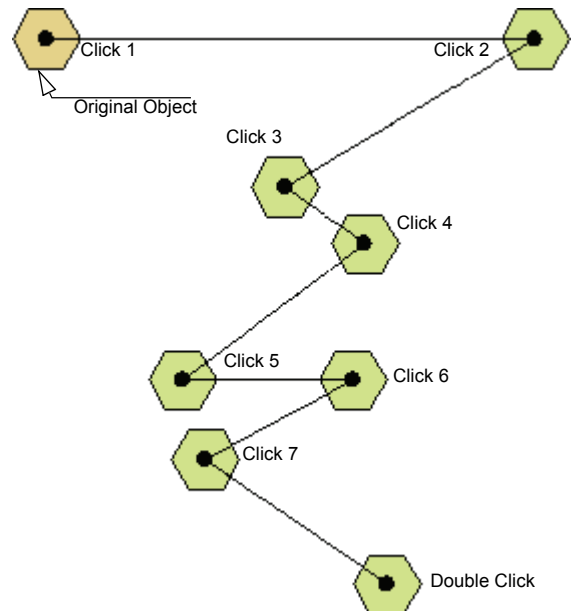


Figure 311.- Construction - Polygonal Array

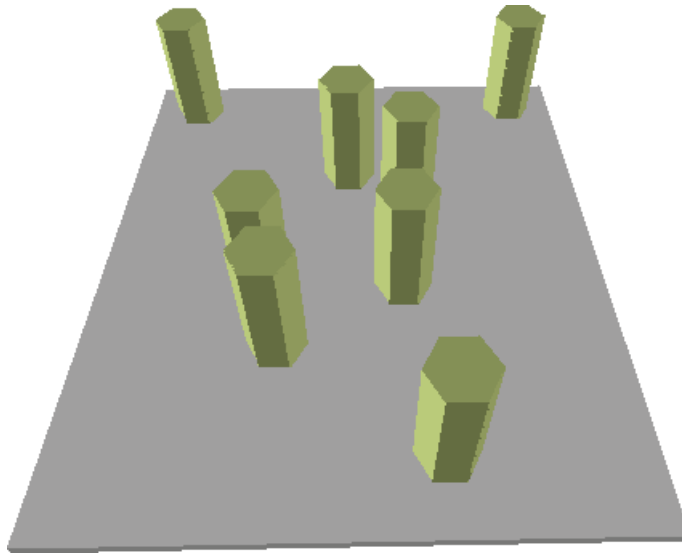


Figure 312.- Sample - Polygonal Array

Change Base Elevation

This tool changes the Base Elevation of 3D objects by a certain amount.



Number of construction points: None
 Number of Construction Vectors: None
 Mode:3D Model

To Change Base Elevation of a 3D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Change Base Elevation Parameters**, page 162)
5. Select the one or more 3D objects to move.
6. Select Insert on the palette's right-hand menu.
7. The selected object will appear moved along the Z axis by the amount indicated by the parameter.

Change Base Elevation Parameters

Parameter	Type	Description
Offset along Z axis	Free	Signed Current Units

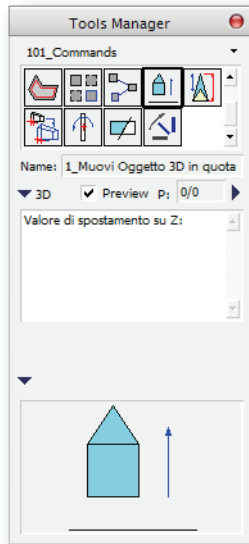


Figure 313.- Tool Manager - Change Base Elevation

Change Object Height

This tool changes the Height of 3D objects by a certain amount.

Number of construction points: 2
Number of Construction Vectors: 1
Mode: 3D Model



To Change Object Height of a 3D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Change Object Height Parameters**, page 163)
5. Select the one or more 3D objects to modify.
6. Select Insert on the palette's right-hand menu.
7. Construct the vector that indicates the height change for the object.
8. The selected object will appear enlarged along the Z axis by the amount indicated by the parameter.

Change Object Height Parameters

Parameter	Type	Description
Offset along Z axis	Free	Signed Current Units

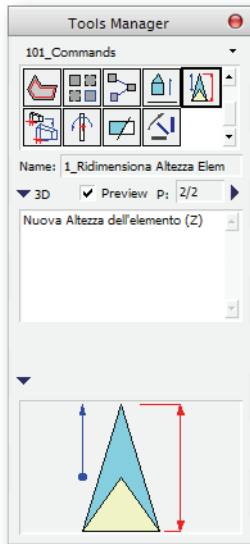


Figure 314.- Tool Manager - Change Object Height

Move & Scale 2D Object

This tool moves and scales 2D objects according to the proportion between two construction vectors.



Number of construction points: 4
Number of Construction Vectors: 3
Mode:2D Draft

To Move & Scale 2D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Move & Scale 2D Object Parameters**, page 164)



5. Select the one or more 2D objects to move.
6. Select Insert on the palette's right-hand menu.
7. Construct a vector to define the initial size and position.
8. Click to set the object's movement offset from its original position.
9. Click to define a vector that will establish the scaling proportion for the moved object.

Note: The object will move and be scaled keeping its original orientation.



10. The selected object will appear moved.

Move & Scale 2D Object Parameters

Parameter	Type	Description
Scale Object's Dimension...	Menu	XY/X/Y

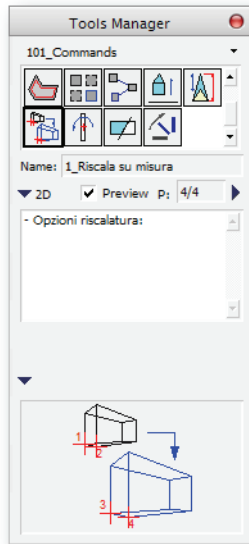


Figure 315.- Tool Manager - Move & Scale 2D Object

Rotate Object

This tool rotates 2D and 3D objects by a given amount.

Number of construction points: 1
Number of Construction Vectors: None
Mode: 2D Draft/3D Model

To Rotate Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Rotate Object Parameters**, page 165)
5. Select the one or more 2D objects to rotate.
6. Select Insert on the palette's right-hand menu.
7. Click to set the center of rotation.
8. The selected object will appear rotated.



Rotate Object Parameters

Parameter	Type	Description
Rotation Angle	Menu	

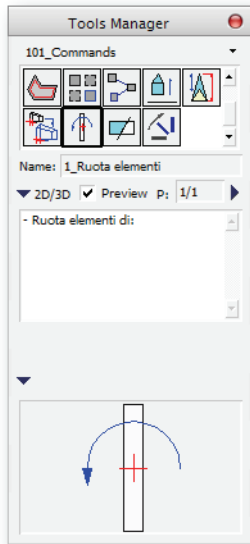


Figure 316.- Tool Manager - Rotate Object

Cut 3D Object

This tool executes boolean cut operations on 3D objects. The procedure allows to cut parts off 3D objects in any view. It is also possible to cut walls and roofs.



Number of construction points: 3
Number of Construction Vectors: 2
Mode:3D Model

Note: This tool is included in some other toolsets.



To Cut 3D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD VectorSpace Commands Folder
3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Cut 3D Object Parameters**, page 167)
5. Select the one or more objects to cut.
6. Change to the appropriate view for the cut you want to make.
7. Set the depth of cut by establishing 3D planes accordingly.

Note: If you want to cut to full object depth, establish 3D planes **OUTSIDE** the objects physical boundaries.



8. Select Insert on the palette's right-hand menu.
9. Construct a first vector through the selected object to set the cut's length.
10. Construct a second vector towards the cut direction. The length of this vector will determine the cut's width. For best precision, make the second vector perpendicular to the first.

Note: This is not necessary if the cut line exceeds the object. ✓

11. When the second vector is completed the object will appear cut.

Note: Use the snaps context menu for utmost precision when setting up cut lines. ✓

Cut 3D Object Parameters

Parameter	Type	Description
Cut Offset	Free	Current Units

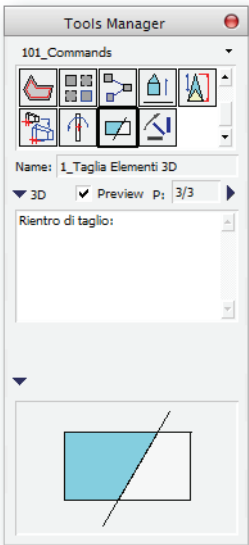


Figure 317.- Tool Manager - Cut 3D Object

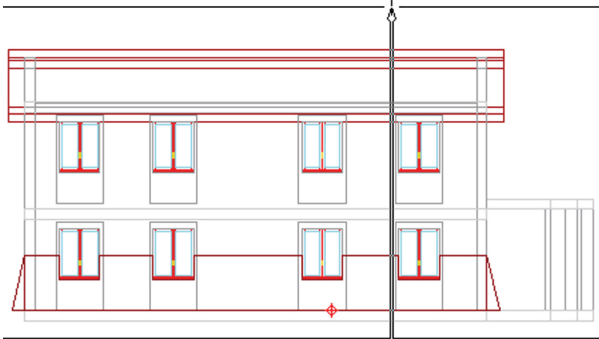


Figure 318.- Cut 3D Object - Set Frontal 3D Plane

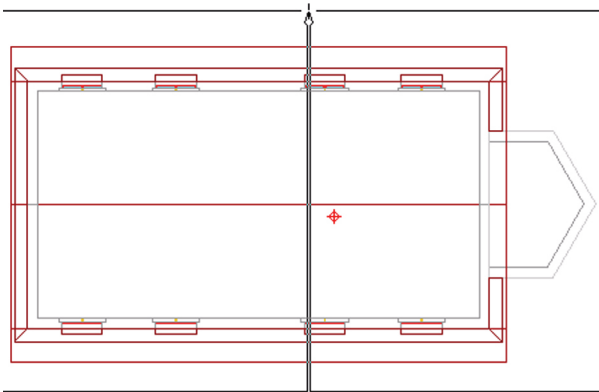


Figure 319.- Cut 3D Object - Set Vertical Plane

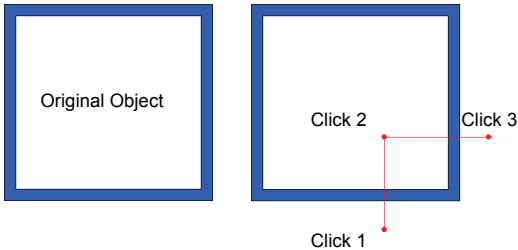


Figure 320.- Construction - Cut 3D Object - Cutting planes

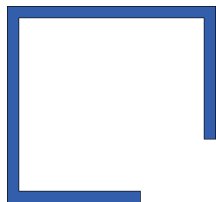


Figure 321.- Cut 3D Object.- Cut Wall - I

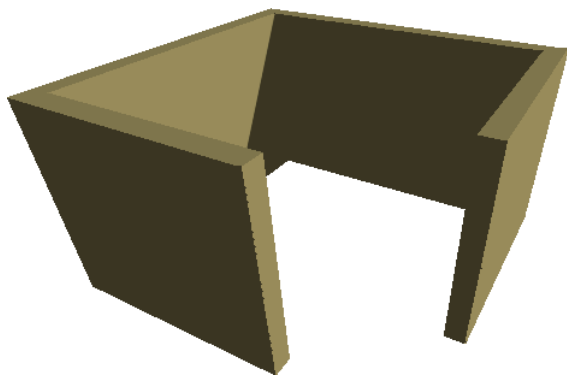


Figure 322.- Cut 3D Object.- Cut Wall - II

Among other uses, this tool can cut niches in walls working from a plan view.

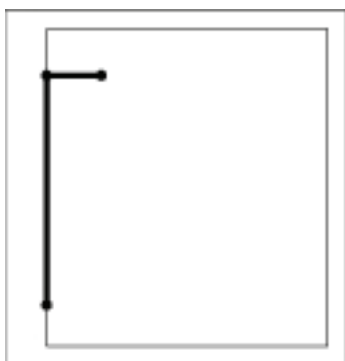


Figure 323.- Cut 3D Object.- Cut a wall niche - I

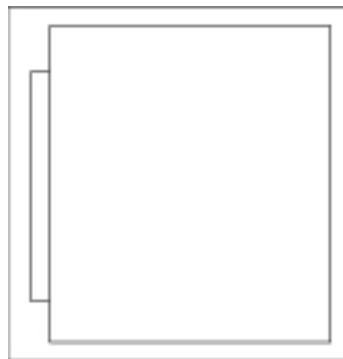


Figure 324.- Cut 3D Object.- Cut a wall niche - II

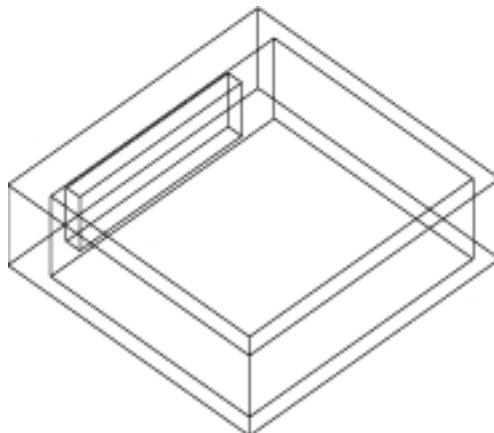


Figure 325.- Cut 3D Object.- Cut a wall niche - III

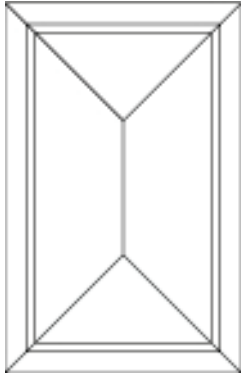


Figure 326.- Cut 3D Object - Cut Walls to Roof Line - I

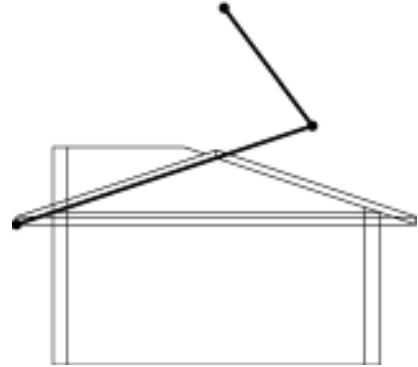


Figure 329.- Cut 3D Object - Cut Walls to Roof Line - IV

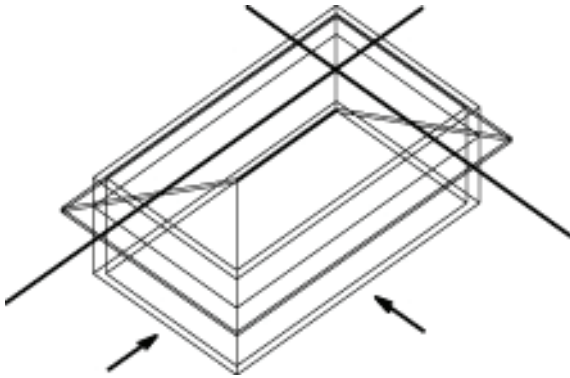


Figure 327.- Cut 3D Object - Cut Walls to Roof Line - II

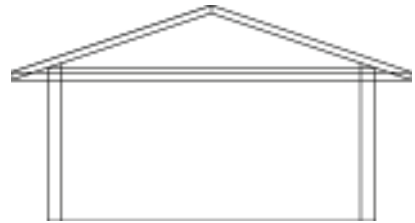


Figure 330.- Cut 3D Object - Cut Walls to Roof Line - V

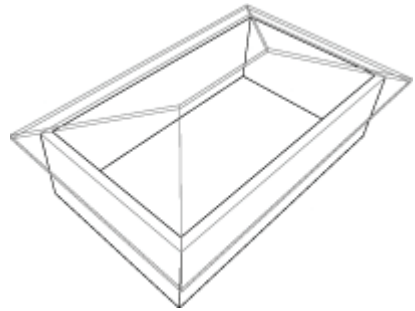


Figure 331.- Cut 3D Object - Cut Walls to Roof Line - VI

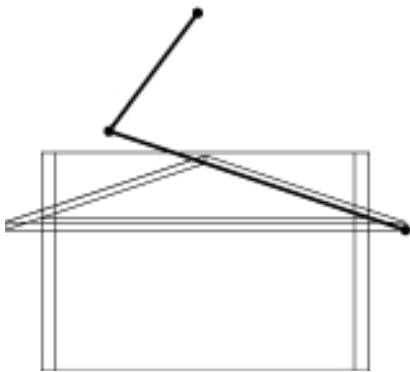


Figure 328.- Cut 3D Object - Cut Walls to Roof Line - III

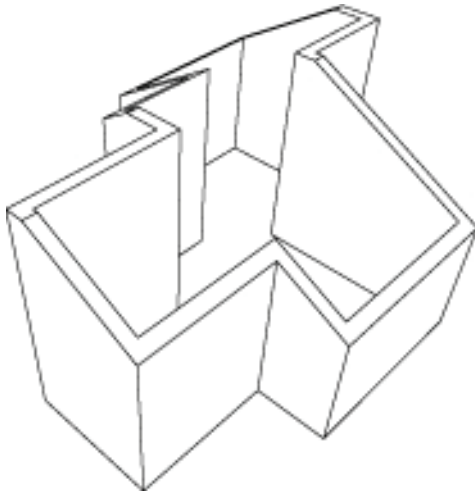


Figure 332.- Sample - Cut 3D Object - I

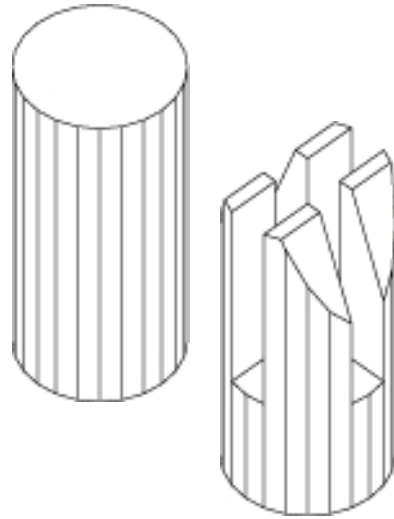


Figure 333.- Sample - Cut 3D Object - II

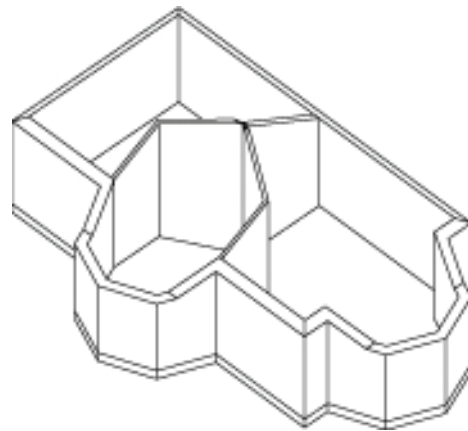


Figure 334.- Sample - Cut 3D Object - III

Polar Array



This tool constructs an array of 2D or 3D objects distributed around a set rotation axis.




Number of construction points: 3
Number of Construction Vectors: 2
Mode: 2D Draft/3D Model


To Construct a Polar Array

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the DCAD VectorSpace Commands Folder 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Polar Array Parameters**, page 171)
5. Select the one or more objects that will be duplicated.
6. Select Insert on the palette's right-hand menu.
7. Click to set the first point of the vector that will be used as base for the array¹.
8. Click on a second point that will complete the vector and be used as the rotation center for the array.

Note: In any case the array's rotation axis will be perpendicular to the active view's base plane. 

9. Click to construct a second vector that will indicate the array's offset angle:
 - If “**Angle Offset Type**” is set to **Offset**, each object copy will be offset from the previous one by the value of this angle.
 - If “**Angle Offset Type**” is set to **Inclusive**, all the object's copies will be drawn, evenly distributed, within this angle.

Note: If a custom angle is indicated, the third click will only be used to finish the tool's insertion. 

10. The Polar Array will appear drawn and selected.

1. All angular parameters will be measured against this vector.

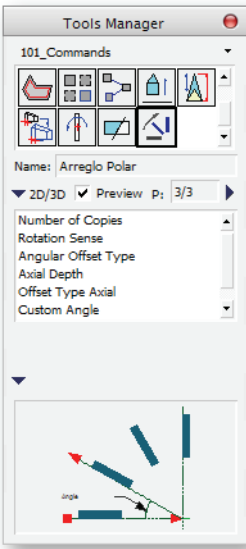


Figure 335.- Tool Manager - Polar Array

Polar Array Parameters

Parameter	Type	Description
Number of Copies	Free	Positive Integer
Rotation Sense	Menu	Clockwise/Counterclockwise
Angular Offset Type	Menu	Offset/Inclusive
Axial Offset ^a	Free	Current Units
Axial Offset Type	Menu	Offset/Inclusive
Custom Angle	Boolean	Yes/No
Custom Angle Value ^b	Free	Current Angular Units

a. active only in 3D Model Mode
 b. active only if “Custom Angle” is checked

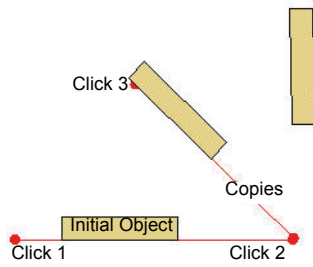


Figure 336.- Construction - Polar Array - Angular Spacing = Offset

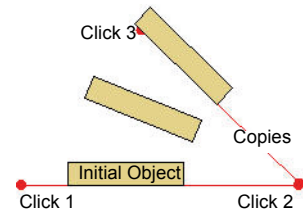


Figure 337.- Construction - Polar Array - Angular Spacing = Inclusive

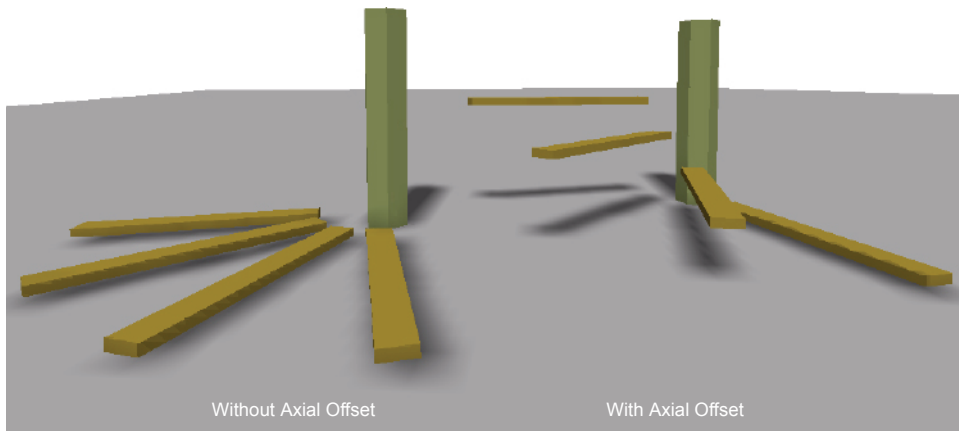


Figure 338.- Sample - 3D Polar Array - Axial Offset

3D Modeling Commands

Holds tools and toolsets related to 3D Modeling Commands.



The following items are available in this toolset:

3D Modeling Commands



Extrude 2D Objects

This tool extrudes selected 2D objects into 3D objects, according to preset values



Bevel Extrude 2D Object

This tool extrudes selected 2D objects into Beveled 3D objects, according to preset values



Spin 2D Object

This tool spin-extrudes selected 2D objects into 3D objects, according to preset values.



Sweep a 2D Profile

This tool sweeps a 2D section profile along a selected 2D object to create tubular 3D objects, according to preset values



Construct 3D Faces

This tool constructs triangular or cuadrangle 3D faces with a given elevation of its centerpoint.



Construct 3D Face Grids

This tool constructs 3D Face arrays that can later be modified for landscape modeling.



Composite Extrusion

This tool constructs complete extrusions of 2D shapes. The resulting objects include floors, walls and roofs.



Extrude Landscape Contours

Extrudes a series of 2D shapes into stacked 3D objects that represent the landscape's relief.



Urban Building Population

This tool constructs urban building mock-ups to preview the future appearance of a construction site.



Set 3D Extrusion Planes

Sets Extrusion Values and Base Elevations to control further extrusions either from 2D or directly from 3D Model.

Extrude 2D Objects

This tool extrudes selected 2D objects into 3D objects, according to preset values



Number of construction points: None
Number of Construction Vectors: None
Mode:2D Draft

To Extrude 2D Objects:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands Folder
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Extrude 2D Objects Parameters**, page 174)
5. Select the 2D object to extrude.
6. Select Insert in the right-hand menu in the tool manager.
7. The Object will be extruded to the equivalent 3D Object.

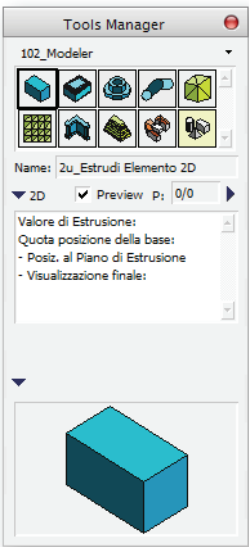


Figure 339.- Tool Manager - Extrude 2D Objects

Extrude 2D Objects Parameters

Parameter	Type	Description
Extrusion Value	Free	Current Units
Object Base Elevation	Free	Current Units
Include in 3D Plane	Boolean	Yes/No
When finished show...	Menu	2D Draft / 3D Model

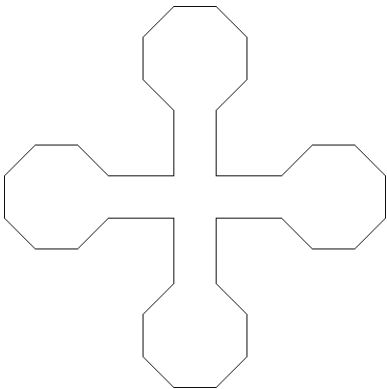


Figure 340.- Extrude 2D Objects - Original Shape for Extrusion

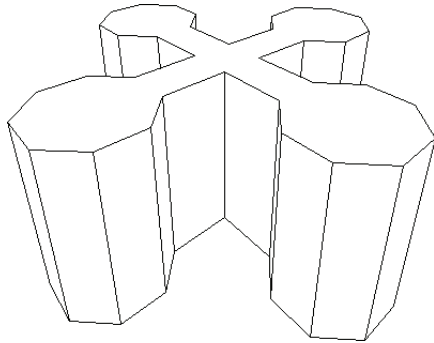


Figure 341.- Extrude 2D Objects - Extruded Object - 3D Hidden Line View.

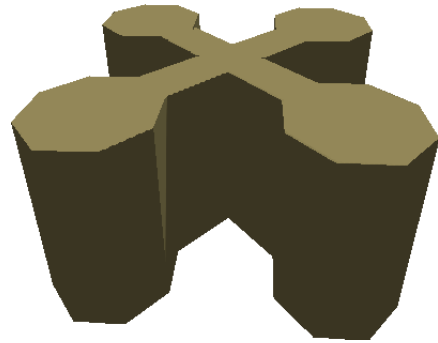


Figure 342.- Extrude 2D Objects - Extruded Object - 3D Render View.

Bevel Extrude 2D Object

This tool extrudes selected 2D objects into beveled 3D objects, according to preset values



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

To Bevel Extrude 2D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands Folder
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Bevel Extrude 2D Object Parameters**, page 175)
5. Select the 2D object to extrude.
6. Select Insert in the right-hand menu in the tool manager.
7. The Object will be extruded to the equivalent 3D Object.

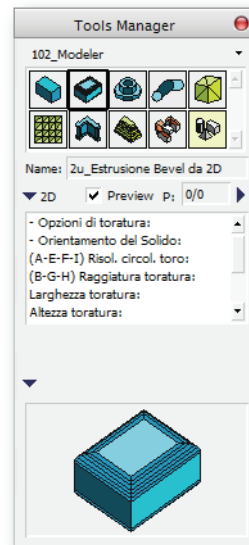


Figure 343.- Tool Manager - Bevel Extrude 2D Object

Bevel Extrude 2D Object Parameters

Parameter	Type	Description
Bevel Profiles	Menu	
Keep Original Shape...	Menu	Inside/Outside
Moulding Radius ^a	Menu	

Bevel Extrude 2D Object Parameters (Continued)

Parameter	Type	Description
Bevel Depth ^b	Free	Current Units
Bevel Length	Free	Current Units
Bevel Width	Free	Current Units
Extrusion Value	Free	Current Units
Moulding Position	Menu	Top/Bottom/Center
Object Base Elevation	Free	Current Units
When finished show...	Menu	2D Draft / 3D Model

- a. active only for circular/elliptical "Bevel Profiles"
b. active only for some Bevel Profiles

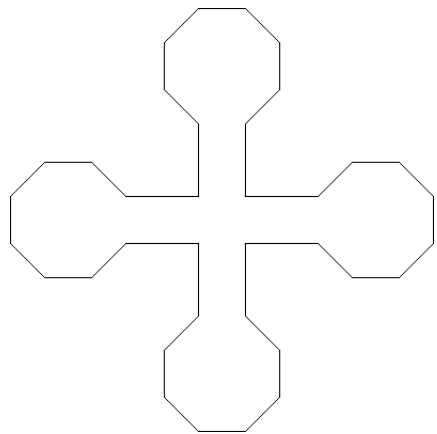


Figure 344.- Bevel Extrude 2D Object - Original Shape for Extrusion

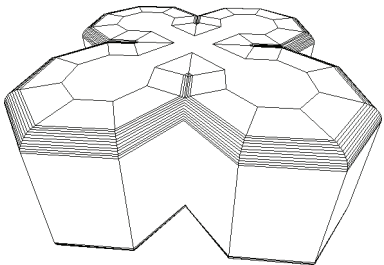


Figure 345.- Bevel Extrude 2D Object - Extruded Object - 3D Hidden Line View.

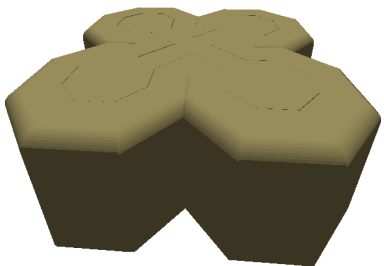


Figure 346.- Bevel Extrude 2D Object - Extruded Object - 3D Render View.

Spin 2D Object

This tool spin-extrudes selected 2D objects into 3D objects, according to preset values



Number of construction points: 1
Number of Construction Vectors: None
Mode: 2D Draft

The spin axis will be set perpendicular to the view plane and located at the clickpoint

To Spin 2D Object:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the 3D Modeling Commands Folder



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Spin 2D Object Parameters**, page 177)



5. Select the 2D object to extrude.
6. Select Insert in the right-hand menu in the tool manager.

7. Click at the intended position for the spin axis
8. The Object will be spin-extruded to the equivalent 3D Object.

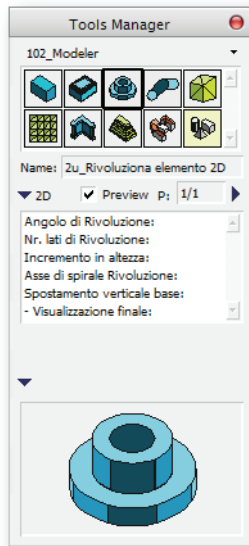


Figure 347.- Tool Manager - Spin 2D Object

Spin 2D Object Parameters

Parameter	Type	Description
Revolution Angle	Free	Current Angular Units
Number of Circular Steps	Free	Positive Integer
Axial Offset	Free	Current Units
Radius Offset	Free	Current Units
Object Base Elevation	Free	Current Units
When finished show...	Menu	2D Draft / 3D Model

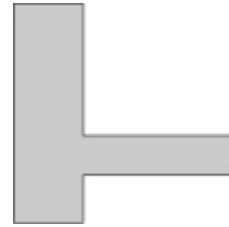


Figure 348.- Spin 2D Object - Original Shape for Extrusion



Figure 349.- Spin 2D Object - Original Shape's location with respect to the origin.

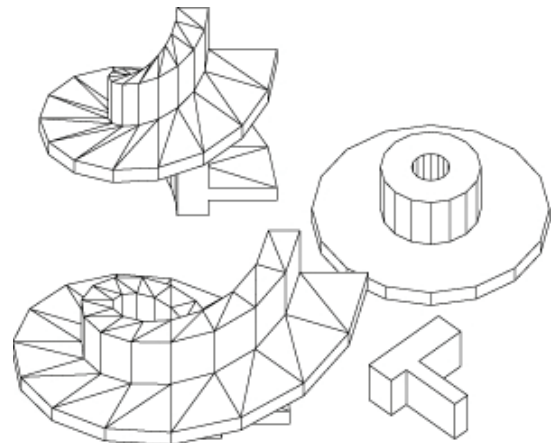


Figure 350.- Spin 2D Object - Extruded Objects - 3D Hidden Line View.



Figure 351.- Spin 2D Object - Multiple Shapes for Extrusion

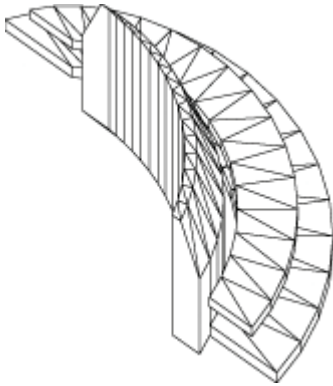


Figure 352.- Spin 2D Object - Multiple Shapes for Extrusion - Resulting Object

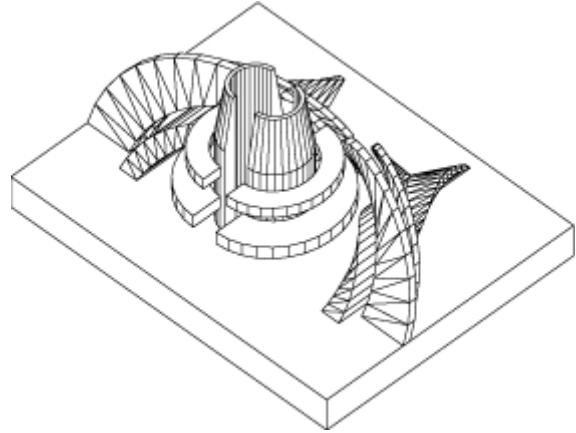


Figure 353.- Spin 2D Object - Composite constructions

Sweep a 2D Profile

This tool sweeps a 2D section profile along a selected 2D object to create tubular 3D objects, according to preset values



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

To Sweep a 2D Profile:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.

2. If necessary, double click on the 3D Modeling Commands Folder



3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Sweep a 2D Profile Parameters**, page 179)

5. Select the 2D shape that the sweep will follow.

6. Select Insert in the right-hand menu in the tool manager.

7. The Object will be spin-extruded to the equivalent 3D Object.

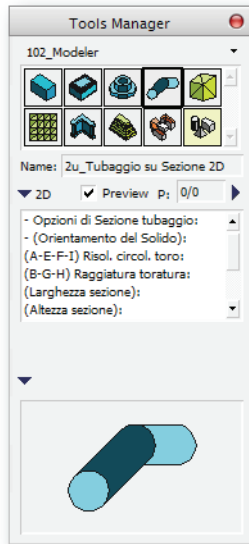


Figure 354.- Tool Manager - Spin 2D Object

Sweep a 2D Profile Parameters

Parameter	Type	Description
Sweep Profiles	Menu	
Sweep path	Menu	Inside/Middle/Outside
Moulding Radius ^a	Menu	
Bevel Depth ^b	Free	Current Units
Bevel Length	Free	Current Units
Bevel Width	Free	Current Units
Scale along X Axis	Free	
Scale along Y Axis	Free	
Object Base Elevation	Free	Current Units
When finished show...	Menu	2D Draft / 3D Model

a. active only for circular/elliptical "Sweep Profiles"

b. active only for some Sweep Profiles

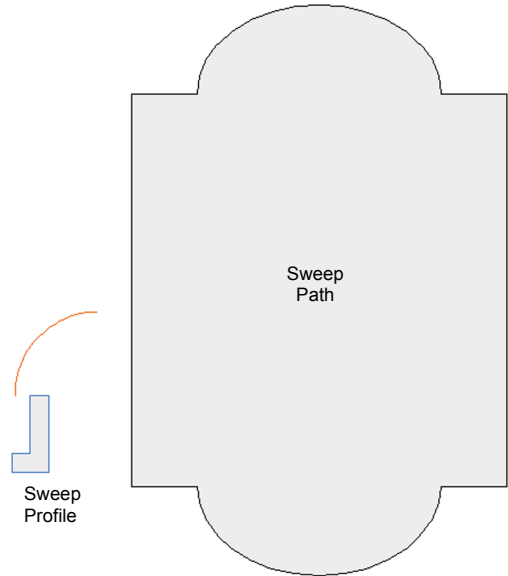


Figure 355.- Construction - Sweep a 2D Profile - I

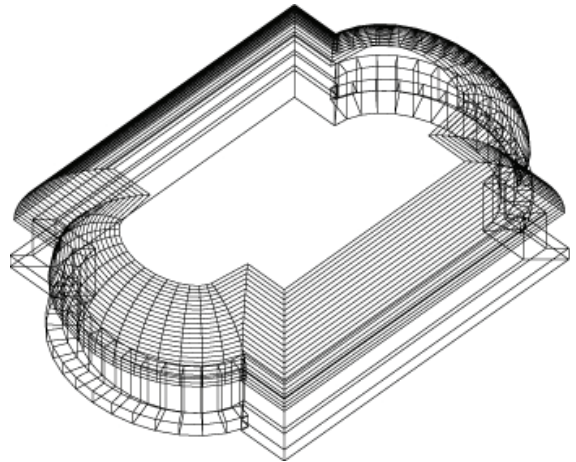


Figure 356.- Sample - Sweep a 2D Profile - Sweep Results - Wire-frame view



Figure 357.- Sample - Sweep a 2D Profile - Scaled Sweep

Construct 3D Faces

This tool constructs triangular or quadrangle 3D faces with a given elevation of its centerpoint.



Number of construction points: 4
Number of Construction Vectors: 3
Mode: 3D Model

It allows to create simple terrain reliefs.

To Construct 3D Faces:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands Folder



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Construct 3D Faces Parameters**, page 181)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the desired shape.



Note: Only the first two vectors will be used for triangular shapes. The triangle will be closed automatically when clicking anywhere on the screen.



7. The Face will appear drawn and selected.

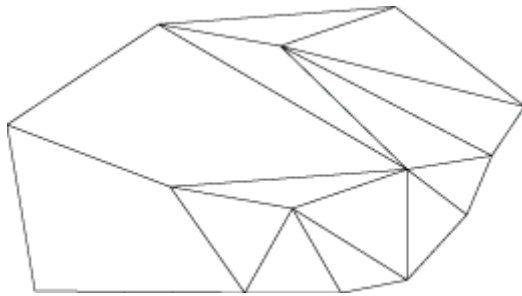


Figure 358.- Sample - Construct 3D Faces - Results - Plan

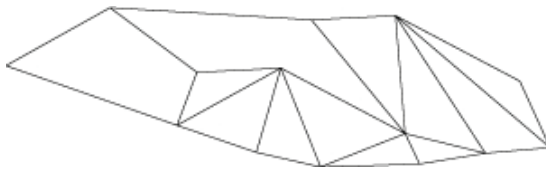


Figure 359.- Sample - Construct 3D Faces - Isometric View

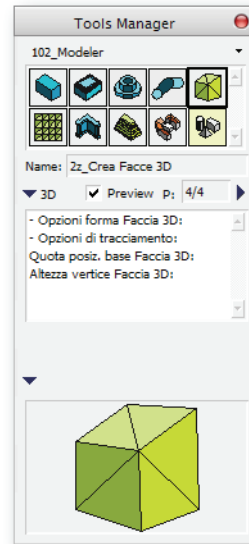


Figure 360.- Tool Manager - Construct 3D Faces

Construct 3D Faces Parameters

Parameter	Type	Description
Face Shape Options	Menu	Triangle/Quadrangle
Draw Options	Menu	Side/Base First
Object Base Elevation	Free	Current Units
Vertex Height	Free	Current Units

Construct 3D Face Grids

This tool constructs 3D Face arrays that can later be modified for landscape modeling.



Number of construction points: 3
Number of Construction Vectors: 2
Mode: 3D Model

To Construct 3D Face Grids:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands Folder



3. Select (click) the tool's icon.



4. Select and modify any required parameter from the tool's parameter list (See **Construct 3D Face Grids Parameters**, page 182)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw the construction vectors to define the grid's width and length.

Note: The first vector controls orientation and - if Use Vector is checked - the width of the



grid. The second vector will be used only to determine the length of the grid - If Use vector is checked - Otherwise, you may click just about anywhere.

7. The Face Grid will appear drawn and selected.

Construct 3D Face Grids Parameters

Parameter	Type	Description
Use Vector	Boolean	Yes/No
Grid Width ^a	Free	Current Units
Grid Length ^b	Free	Current Units
Grid Cell Width	Free	Current Units
Grid Base Elevation	Free	Current Units

- a. active only if "Use Vector" is not checked
- b. active only if "Use Vector" is not checked

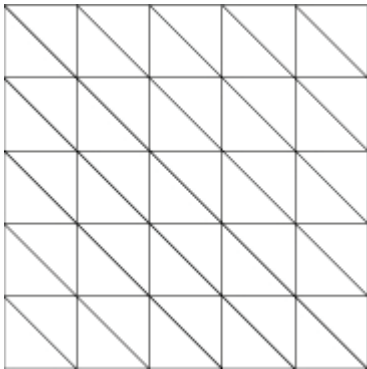


Figure 361.- Sample - Construct 3D Face Grids - Results - Plan

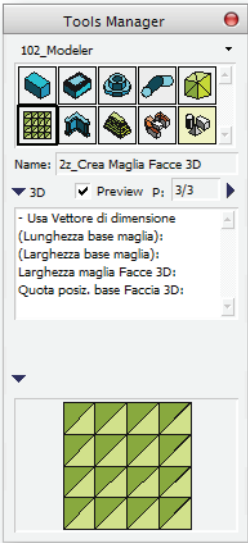


Figure 362.- Tool Manager - Construct 3D Face Grids



Figure 363.- Sample - Construct 3D Face Grids - Front View

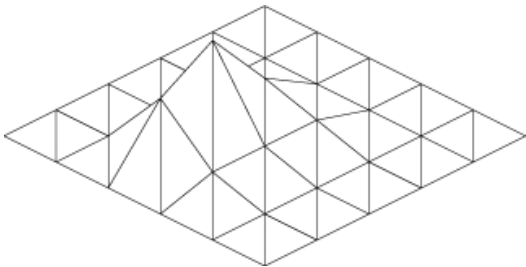


Figure 364.- Sample - Construct 3D Face Grids - Isometric Render

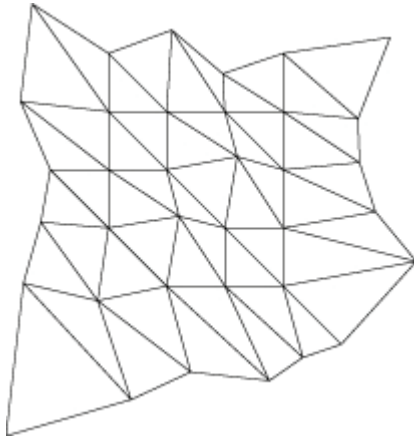


Figure 365.- Sample - Construct 3D Face Grids - Modified Grid - Plan View

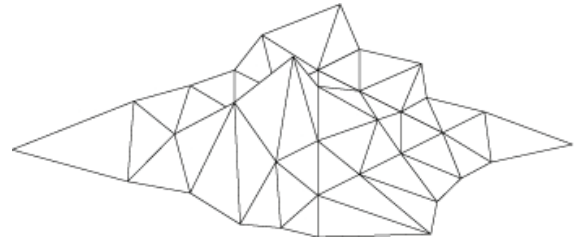


Figure 366.- Sample - Construct 3D Face Grids - Modified Grid - Isometric Render

A Working Tip

To simplify the modification of grid vertex elevations:

1. Create a new work layer and name it “Elevations”
2. Draw colored 3D shapes, centered on the grid vertex. Assign a different colors to shapes linked to each different grid elevation.
3. Select similar colored shapes in this layer.
4. Use the information manager to name each set of objects with names related to the elevation data. i.e. “+3.5mt”. “-7.8mt”, etc.
5. Lock the layer.

6. Activate the Layer containing the grid.

7. Use the Vertex Selection Tool to select similar elevation grid vertex.



Note: Use the previously defined colored shapes as guidelines to select the proper vertex.



8. Use the Move Base Elevation Parametric Tool (See See **Change Base Elevation**, page 162 in the **DCAD VectorSpace Commands**, page 153) to move these vertex to the desired elevations.

Note: This procedure allows precise positioning of the vertex elevations and consistent setting without repetitive - and error prone - typing.



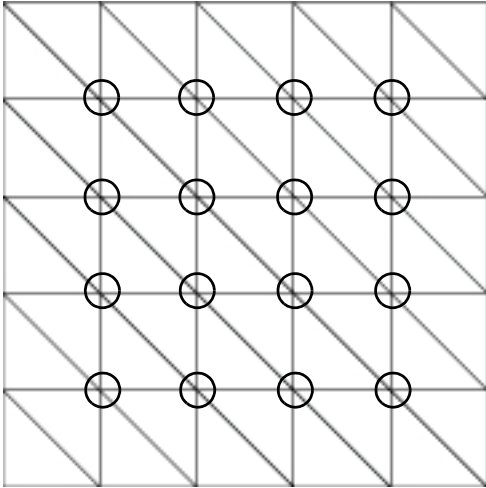


Figure 367.- A Working Tip - Construct 3D Face Grids



Composite Extrusion

Creates complete extrusions of 2D shapes. The resulting objects include floors, walls and roofs.



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Drafting

To Construct a Composite Extrusion:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See **Composite Extrusion Parameters**, page 184)

5. Select one or more 2D objects to be extruded into 3D
6. Select Insert in the right-hand menu in the tool manager.
7. The Objects will be extruded into 3D solids and appear selected in the 3D Model Mode.

Composite Extrusion Parameters

Parameter	Type	Description
Wall Type	Menu	
Wall Offset Direction	Menu	
Wall Offset	Free	Current Units
Base Slab Thickness	Free	Current Units
Wall Height	Free	Current Units
Roof Slab Thickness	Free	Current Units
Wall Base Elevation	Free	Current Units
When ready display...	Menu	2D/3D

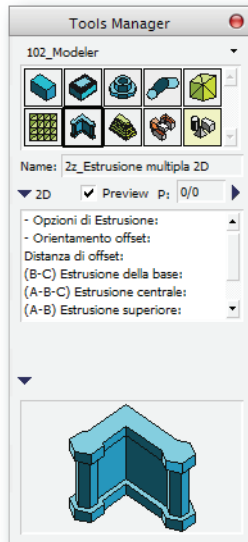


Figure 368.- Tool Manager - Composite Extrusion

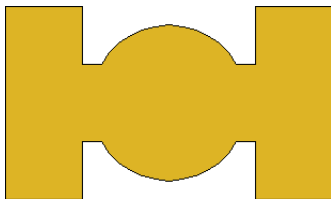


Figure 369.- Composite Extrusion - Original 2D objects

Extrude Landscape Contours

Extrudes a series of 2D shapes into stacked 3D objects that represent the landscape's relief.



Number of construction points: none
Number of Construction Vectors: none
Mode: 2D Drafting

Note: The objects are extruded in the "drawing stacking order", i.e. The bottom object is extruded first, the next object in stacking order is extruded next, and so on.

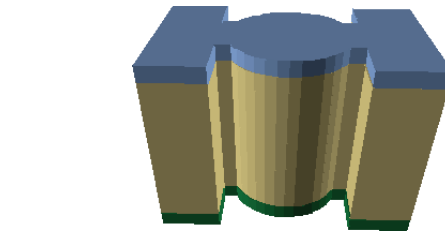




Figure 370.- Composite Extrusion - Resulting 3D Solids - Render view



Figure 371.- Composite Extrusion - Resulting 3D Solids - Render view. Top is moved to show wall construction.

To Extrude Landscape Contours:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands folder. 
3. Select (click) the tool's icon. 
4. Select and modify any required parameter from the tool's parameter list (See

Extrude Landscape Contours Parameters,
page 186)

- 5. Select one or more 2D objects to be extruded into 3D
- 6. Select Insert in the right-hand menu in the tool manager.
- 7. The Objects will be extruded into 3D solids and appear selected in the 3D Model Mode.

Extrude Landscape Contours Parameters

Parameter	Type	Description
Number of Selected Objects	Free	Positive Integer
Extrusion Thickens	Free	Current Units
Base Elevation	Free	Current Units
When ready display...	Menu	2D/3D

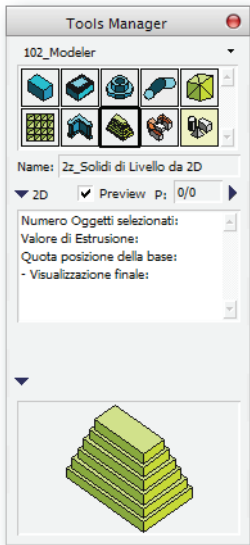


Figure 372.- Tool Manager - Extrude Landscape Contours

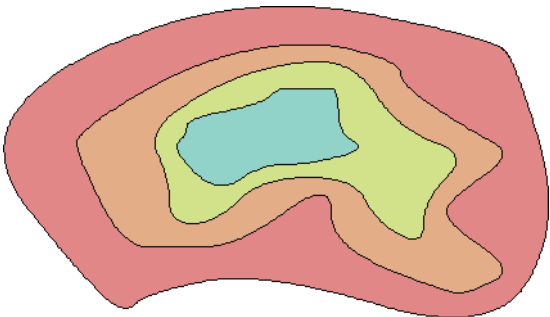


Figure 373.- Extrude Landscape Contours - Original 2D objects - Colored for clarity

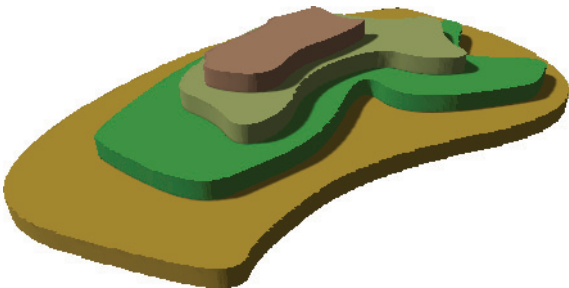


Figure 374.- Extrude Landscape Contours - Resulting 3D Solids - Render view



Figure 375.- Extrude Landscape Contours - Resulting 3D Solids - Render view. Objects are floated to show method

Urban Building Population

This tool construct urban building mock-ups to preview the future appearance of a construction site.



Number of construction points: 2-50
Number of Construction Vectors: 1-48
Mode: 3D Model

To Construct an Urban Building Population:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands folder.
3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Urban Building Population Parameters**, page 187)
5. Select Insert in the right-hand menu in the tool manager.
6. Draw a polygonal line along the intended building line in your 3D plan view.



Note: Remember to finish the polyline with a double-click.



7. The tool will create a series of mock-up buildings along the drawn polyline.

Urban Building Population Parameters

Parameter	Type	Description
Building Type	Menu	
Building Block Width	Free	Current Units
Building Block Wall Height	Free	Current Units
Roof Peak Height above Wall tops	Free	Current Units

Urban Building Population Parameters

Parameter	Type	Description
Building Base Elevation	Free	Current Units

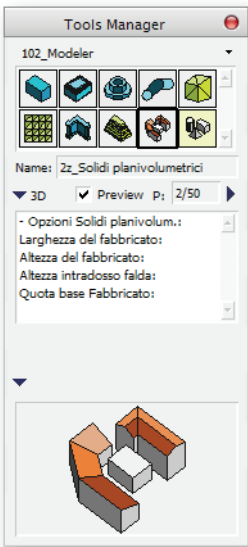


Figure 376.- Tool Manager - Urban Building Population

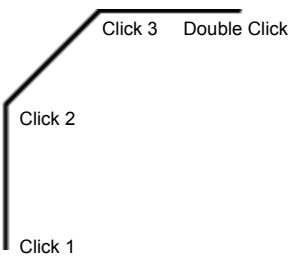


Figure 377.- Construction - Urban Building Population

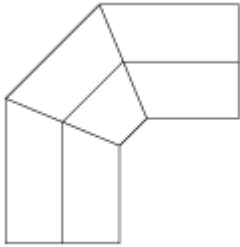


Figure 378.- Sample - Urban Building Population - Plan View

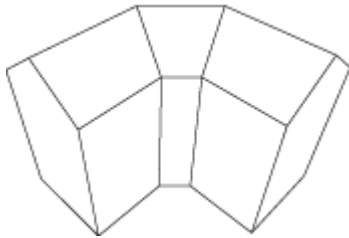


Figure 379.- Sample - Urban Building Population - Perspective

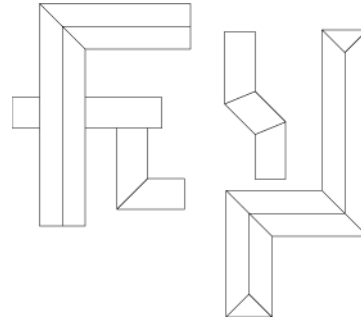


Figure 380.- Sample - Urban Building Population - I

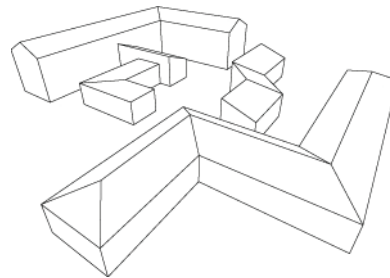


Figure 381.- Sample - Urban Building Population - II

Set 3D Extrusion Planes

Sets Extrusion Values and Base Elevations to control further extrusions either from 2D or directly from 3D Model.



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft/3D Model

To Set 3D Extrusion Planes:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the 3D Modeling Commands folder.



3. Select (click) the tool's icon.
4. Select and modify any required parameter from the tool's parameter list (See **Set 3D Extrusion Planes Parameters**, page 188)
5. Select Insert in the right-hand menu in the tool manager.
6. The tool will have set 3D planes subject to the inserted parameter values.



Set 3D Extrusion Planes Parameters

Parameter	Type	Description
Extrusion Value	Free	Current Units
Base Elevation	Free	Current Units

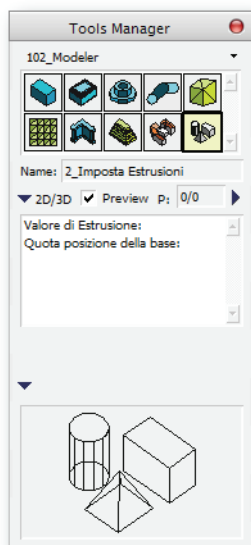



Figure 382.- *Tool Manager - Urban Building Population*

DCAD line Commands




Holds tools and toolsets related to the DCAD line Model Processing System.



Note: To get more detailed information of these tools please refer to the **DCAD line Reference Manual** 

The following items are available in this toolset:

DCAD line Commands

	Set Model for PTF Export	This tool processes a 3D model to optimize the PTF exported data according to the required rendering intent.
	Process	This Tool comes automatically generated from the external DCAD line module
	Render Effects	This Tool comes automatically generated from the external DCAD line module

These tools are intended to be used in the sequence shown and involve an external software module — **DCAD line** — included in the **DCAD VectorSpace** distribution media.

Further description of these commands and the use of the **DCAD line** software may be found in the enclosed **DCAD line** Reference Manual.

Set Model for PTF Export


This tool processes a 3D model to optimize the PTF¹ exported data according to the required rendering intent.




Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

To Set Model for PTF Export:

1. Select a 2D Drawing; a Hidden Line perspective, for example.
2. If the Tool Manager is not visible, select **Windows > Tool Manager**.

3. If necessary, double click on the DCAD line Commands Folder 

4. Select (click) the tool's icon. 

Note: Notice that all elements are unchained and all other objects become hidden. 

5. Select the Save as option from the File Menu
6. In the open Save as Dialog, select the PTF option from the Formats menu.
7. Select the Visible Objects Option from the Save as Options menu.
8. Set the filename
9. Press **OK** to confirm the action.

In the dialog that opens...

1. The **PTF** format is a proprietary format of **DOTSoft Inc.** licensed to be used by **DCAD line**.

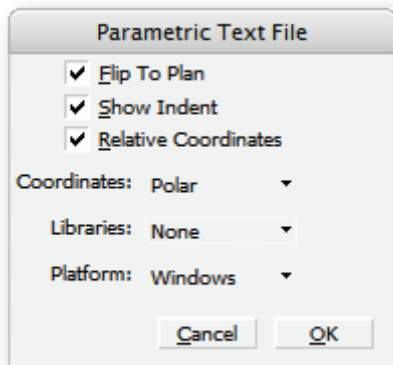


Figure 383.- Parametric Text File Save Options Dialog

10. Select the Polar Coordinates Option
11. Select the None option from the Library options menu.
12. Press Ok to confirm the action
13. If the Tool Manager is not visible, select **Windows > Tool Manager**.
14. If necessary, double click on the DCAD line Commands Folder
15. Select (click) the tool's icon.
16. Select and modify any required parameter from the tool's parameter list (See **Set Model for PTF Export Parameters**, page 192)
17. Select the 3D Model to process.

Process

This Tool is automatically generated by the external module **DCAD line**.



Once **DCAD line** finishes a process, it automatically generates a corresponding function that will appear in **DCAD VectorSpace's** Tool Manager and will signal the fact with a Beep sound.

The procedures of the “Process” menu of **DCAD line**, are inherent to the vectorial analysis on lines in

18. Select Insert in the right-hand menu in the tool manager.
19. The 3D Model will be processed and ready for PTF export.

Set Model for PTF Export Parameters

Parameter	Type	Description
Rendering Intent	Menu	

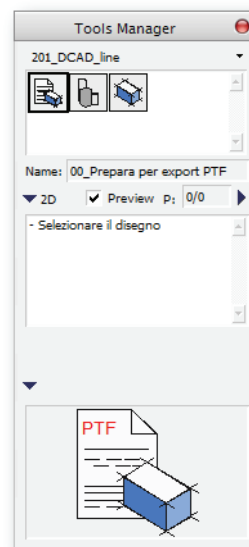




Figure 384.- Tool Manager - Set Model for PTF Export

order to eliminate particular elements dimensions or values greater or smaller angle regarding a determined value set up from a similar operator or function.

Number of construction points: None
Number of Construction Vectors: None
Mode:2D Draft

To Process using DCAD line:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD line Commands Folder 
3. Select (click) the tool's icon. 
4. Select Insert in the right-hand menu in the tool manager.
5. The result will appear in the active **DCAD VectorSpace** window.

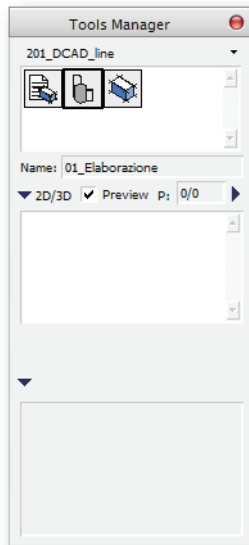


Figure 385.- Tool Manager - Process

In the following example, the intent is to remove the face boundary lines generated by **DCAD VectorSpace** for cylindrical objects, keeping only the object outlines and the top and bottom cap edges if visible from the selected viewpoint.

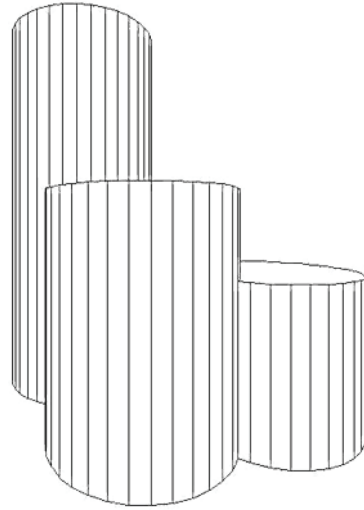


Figure 386.- Sample - Process I

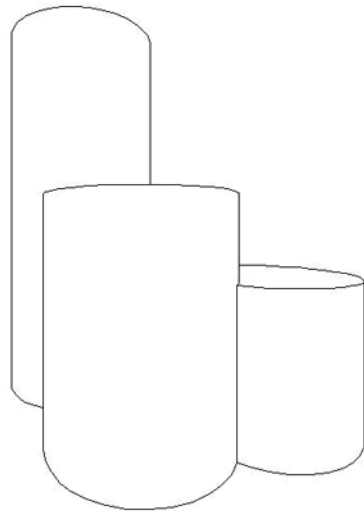


Figure 387.- Sample - Process II

Render Effects



This tool processes a 3D model to achieve several style of “hand drawn” presentation effects.



Number of construction points: None
Number of Construction Vectors: None
Mode: 2D Draft

Once **DCAD line** finishes a process, it automatically generates a corresponding function that will appear in **DCAD VectorSpace**’s Tool Manager and will signal the fact with a Beep sound.

To set Render Effects:

1. If the Tool Manager is not visible, select **Windows > Tool Manager**.
2. If necessary, double click on the DCAD line Commands Folder 
3. Select (click) the tool’s icon. 
4. Select Insert in the right-hand menu in the tool manager.
5. The result will appear in the active **DCAD VectorSpace** window.

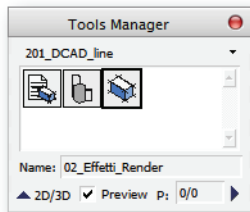


Figure 388.- Tool Manager - Render Effects

Some samples of Hand-Drawn effects rendered by **DCAD line** are as follow:

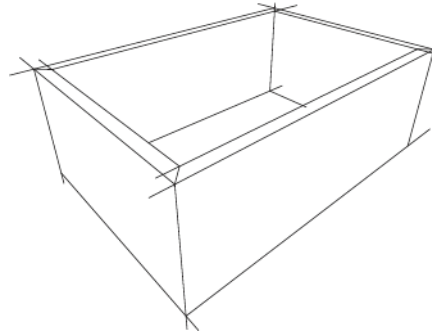


Figure 389.- Sample - Render Effects I - ‘Zaft’

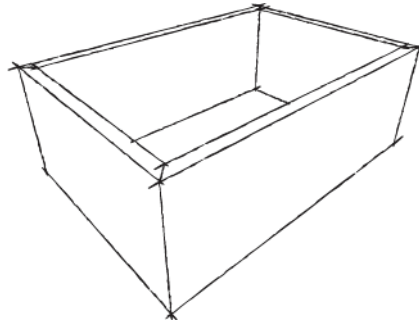


Figure 390.- Sample - Render Effects II - ‘Charcoal’

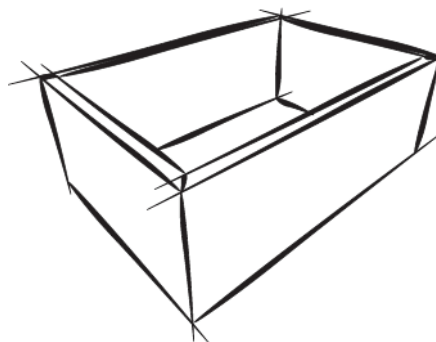


Figure 391.- Sample - Render Effects III - ‘Comics’

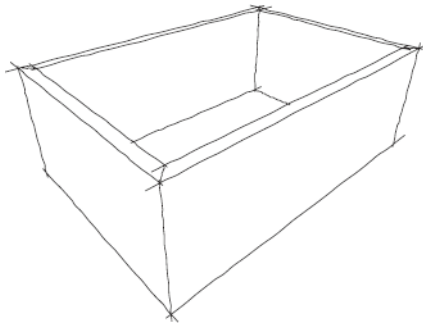


Figure 392.- Sample - Render Effects IV - 'Free hand'

How to...

A

Add

Dimensioning Text to a Line Segment 37

B

Bevel Extrude

2D Object 175

C

Change

- Base Elevation of a 3D Object 162
- Object Height of a 3D Object 163

Close

- An open palette 9

Construct

- 2D Shapes 66
- 2D Windows 80
- 3D Curved Walls 62
- 3D Face Grids 181
- 3D Faces 180
- 3D Semi-Circular Walls 57
- 3D U-Walls 58
- 3D Walled Corners 56
- 3D Walls Spans 59
- A 1 Drawer Hanging Cabinet 127
- A 2 Drawer File Cabinet 121
- A 2 Drawer Hanging Cabinet 126
- A 2D Door/Window Dimension 40
- A 2D Multi-Level Dimension 38
- A 2D Polygonal Cell 65
- A 3 Drawer File Cabinet 123
- A 3D Cone 48
- A 3D C-Section Beam 43
- A 3D Cylinder 47
- A 3D H-Section Beam 46
- A 3D L-Section Beam 43
- A 3D Polygonal Rain Gutter 116
- A 3D Pyramid 50

- A 3D Rectangular Wall 60
- A 3D Transition 94
- A 3D Truncated Pyramid 51
- A 3D T-Section Beam 44
- A 3D Z-Section Beam 45
- A 4 Drawer Cabinet 124
- A Bicubic Arc 15
- A Bisecting Line 28
- A Center-End Line 29
- A Central Counter 144, 146
- A Circle Diameter 23
- A Circle Edge to Center 22
- A Circle Tangent to Vectors 24
- A Composite Extrusion 55, 184
- A Desk Front Panel 135
- A Division Panel 142
- A Dome 105
- A Door 72
- A Door Division Panel 140
- A Double Casement Window 90
- A Double Extensible Counter 147
- A Drawer Cabinet 130
- A File Cabinet 120
- A Free Line 27
- A Glazed Window 88
- A Grid Array 159
- A Half-Round Counter 150
- A Hanging Cabinet 128
- A Joining Kit 138
- A Linked Line 26

A Louvered Panel 86
A Paper Storage Cabinet 132
A Parallelogram 31
A Pedestal 136
A Polar Array 170
A Polygonal 3D Wall 64
A Polygonal Array 161
A Polygonal Based Peaked Roof 106
A Polygonal Based Roof 109
A Rain Gutter from 2D 114
A Rectangular Door 70
A Rectangular Roof Panel 111
A Rectangular Window 81
A Regular Polygon by Side 34
A Roof from 2D 108
A Shelf 133
A Side-Center Regular Polygon 33
A Sliding Windows 87
A Spiral Stair 96
A Stair Transition from 2D 93
A Straight Corner Counter 148
A Straight Counter 151
A Trapezoid 32

A Trapezoidal Roof Panel 112
A Triangular Roof Panel 113
A Two Point Arc 16
A Two-Flight U Staircase 98
A Vertex to Center Regular Polygon 35
A Window with Blinds 84
A Windowsill 82
An Arc by Endpoint, Center and Angle 17
An Arc by Endpoint, Center and Direction 18
An Inside Tangent Arc 19
An Outside Tangent Arc 20
An Urban Building Population 187
Louvered Shutters 83
Stair Steps from a 2D Shape 100
Stair Steps from a 3D Polyline 101
Stair Treads from 2D 95

Convert

An Object to Library 154
Line to Fill 155

Cut

3D Object 166

E

Extrude

2D Objects 174

2D Shapes 54

Landscape Contours 185

H

Hide

A DCAD Tool Palette 9

Help images for the selected tool 6

Several DCAD Tool Palettes 10

I

Construct

A Single Flight Staircase 97

Tile

2D Vector Fill 156

Tile

2D Vector Fill 156

Insert

A Door from Library 69

A Window from Library 77

Construct

A Single Flight Staircase 102

M

Move A DCAD Tool Palette 10
2D Object 164

N

Name Object 157

O

Offset A 2D Shape 158

Open A DCAD VectorSpace tool folder 4
The Parametric Tool Manager Palette 3

P

Punch Wall for Window 77

R

Reshape In the tool folder hierarchy 4
A DCAD Tool Palette 10

Rise

Rotate Object 165

S

Scale 2D Object 164

Select A DCAD VectorSpace Tool 4
A tool from the icon menu 11

Set Model for PTF Export 191
Render Effects 194
The Parameters for a DCAD VectorSpace Parametric Tool 12

Show A DCAD Tool Palette 9
Help images for the selected tool 6
Several DCAD Tool Palettes 10
The modifiable parameters of a parametric tool 4

Spin 2D Object 176

Sweep A 2D Profile 178

T

To 193

U

Use A DCAD VectorSpace tool from a palette 11

A parametric tool 6