TerrainCAD for Rhino Help

Table Of Contents

TerrainCAD for Rhino Help

Welcome to *TerrainCAD for Rhino* Help!

This help file provides all the information you need to understand and use *TerrainCAD for Rhino*. Click the links below or use the Contents tab on the left to browse help topics. You can also scroll the topics on the above right hand pane.

The *TerrainCAD for Rhino* help file is divided into the following sections:

- Introduction - Introduction to *TerrainCAD for Rhino.*
- Command Reference - Quick reference of all the commands added by *TerrainCAD for Rhino.*
- Tutorials - Tutorials to get you started in the shortest possible time.

If you need any additional information please contact SYCODE.

Note:

- If you are having trouble loading the *TerrainCAD for Rhino* plug-in file into the Rhino environment please refer to the ReadMe file.
- Please read the License Agreement before using the software.
- Please check out TerrainCAD, our terrain mesh generation, editing and modeling software. TerrainCAD is a standalone product and does not need Rhino or any other software.

Introduction

TerrainCAD for Rhino is a terrain modeling plug-in for Rhinoceros. This plug-in gives Rhino the ability to generate a terrain mesh from a set of unordered points, contours and polylines. The terrain mesh is created as a Delaunay Triangulation, which is regarded as the best method to create a terrain mesh from unorganized point data. *TerrainCAD for Rhino* can also import a set of points from a text file containing point coordinate data.

TerrainCAD for Rhino can solidify a terrain mesh by giving it thickness.

TerrainCAD for Rhino is designed to work with the following versions of Rhino:

- Rhino 5.0 (64 Bit)
- Rhino 4.0, 5.0 (32 Bit)
- Rhino 3.0

TerrainCAD for Rhino is designed to be extremely user friendly and easy to understand. Once installed, it automatically loads itself into the Rhino environment. If automatic loading fails there are manual loading instructions in the ReadMe file. Once loaded it adds new commands to Rhino's existing commands and a new submenu called "TerrainCAD" to the Rhino menu containing these newly added commands.

TerrainCAD for Rhino is powered by TerrainLib, a state of the art terrain mesh generation, editing and modeling library developed by SYCODE. TerrainLib employs blazing fast algorithms and cutting-edge technology to yield superior terrain models in very less time.

TerrainCAD for Rhino comes with detailed documentation for each command as well as a set of tutorials to get you started in the shortest possible time.

If you need any additional information please contact SYCODE.

ReadMe

This is the *TerrainCAD for Rhino* ReadMe file.

```
TerrainCAD for Rhino is a plug-in for Rhinoceros. TerrainCAD for Rhino adds
several new commands to Rhino. It also adds a new menu to the Rhino menu
called "TerrainCAD" which contains these newly added TerrainCAD commands.

Automatic Loading:
==================
TerrainCAD for Rhino has to be loaded into the Rhino before it can be
used. The installer does this automatically. The next time you run Rhino
you will see the "TerrainCAD" menu added to the Rhino menu. Due to an
installation problem, if the "TerrainCAD" menu does not appear then you
will have to manually load the plug-in into Rhino.

Manual Loading:
===============
The TerrainCAD for Rhino plug-in files are installed into the TerrainCAD
for Rhino installation folder (typically "C:\Program
Files\SYCODE\TerrainCAD for Rhino\"). The plug-in files have an extension
of ".rhp". There is one plug-in file for each version of Rhino. The plug-
in file name indicates the version of Rhino that it has been designed
for.

The list of plug-in files along with the version of Rhino is shown below.
Please be sure to use the plug-in file that corresponds to your version
of Rhino.

TerrainCAD_VC60.rhp    -> Rhino 3.0
TerrainCAD_VC80.rhp    -> Rhino 4.0, 5.0 (32 Bit)
TerrainCAD_VC80x64.rhp -> Rhino 5.0 (64 Bit)

To load TerrainCAD for Rhino into Rhino please follow the steps listed
below:
(1) Start Rhino
(2) Type "PlugInManager" at the command prompt and press "Enter"
(3) Click the "Install" button.
(4) Browse for the plug-in file for your version of Rhino in the
TerrainCAD for Rhino installation folder.
(5) Click the "Open" button.
(6) Click the "Close" button.

Usage:
======
TerrainCAD for Rhino adds a new menu to Rhino called "TerrainCAD". All
the TerrainCAD commands can be invoked from this new menu.

Support:
========
For support, please E-Mail support@sycode.com
```

TerrainLib

TerrainLib is a state of the art terrain mesh generation, editing and modeling library developed by SYCODE. This library gives *TerrainCAD for Rhino* its terrain modeling capabilities.

One of the salient features of TerrainLib is its ability to create a terrain mesh from a set of unordered survey points. The mesh is created as a Delaunay Triangulation. TerrainLib employs blazing fast algorithms and cutting-edge technology to yield superior terrain models in no time.

For more information on TerrainLib, please contact SYCODE.

Delaunay Triangulation

A triangulation is the division of a set of points into a set of triangles, usually with the restriction that each triangle side is entirely shared by two adjacent triangles.

A Delaunay Triangulation of a set of points is a triangulation with the property that every edge is contained in a circle that contains no other points of the set. This implies that the circumcircle, or outcircle, of each triangle contains no other points from the set. The Delaunay Triangulation guarantees that the smallest angle will be maximal which gives well shaped triangles.

Interesting Fact: One would hope that the Delaunay Triangulation would be the result of repeatedly joining the two closest points unless doing so would cross an edge you already have, but sadly that turns out not to be the case. For example, take a kite with its head angle close to 180 degrees and its tail angle quite small. The two closest points are the side points, but the Delaunay Triangulation joins the head to the tail.

Contact

Mailing address	S1/116, Nova Cidade Complex, NH 17, Alto Porvorim, Goa - 403521 India
Phone	+91 9822689298
Fax	+91 832 2416615
E-Mail	info@sycode.com
Web Site	http://www.sycode.com

License Agreement

SYCODE END USER LICENSE AGREEMENT

READ CAREFULLY: SYCODE LICENSES THIS SOFTWARE TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS CONTAINED IN THIS SOFTWARE LICENSE AGREEMENT.

BY SELECTING THE "I ACCEPT" BUTTON AT THE END OF THIS AGREEMENT OR BY COPYING, INSTALLING, UPLOADING, ACCESSING OR USING ALL OR ANY PORTION OF THE SOFTWARE YOU AGREE TO ENTER INTO THIS AGREEMENT. A CONTRACT IS THEN FORMED BETWEEN SYCODE AND EITHER YOU PERSONALLY, IF YOU ACQUIRE THE SOFTWARE FOR YOURSELF, OR THE COMPANY OR OTHER LEGAL ENTITY FOR WHICH YOU ARE ACQUIRING THE SOFTWARE.

IF YOU DO NOT AGREE OR DO NOT WISH TO BIND YOURSELF OR THE ENTITY YOU REPRESENT: (A) DO NOT COPY, INSTALL, DOWNLOAD, ACCESS OR USE THE SOFTWARE; (B) SELECT "I REJECT" AT THE END OF THIS AGREEMENT (WHICH WILL CANCEL THE LOADING OF THE SOFTWARE); AND (C) WITHIN THIRTY (30) DAYS FROM THE DATE OF ACQUISITION, RETURN THE SOFTWARE TO THE LOCATION WHERE YOU ACQUIRED IT FOR A REFUND.

COPYING OR USE OF THIS SOFTWARE OR ANY ACCOMPANYING DOCUMENTATION EXCEPT AS PERMITTED BY THIS AGREEMENT IS UNAUTHORIZED AND CONSTITUTES A MATERIAL BREACH OF THIS AGREEMENT AND AN INFRINGEMENT OF THE COPYRIGHT AND OTHER INTELLECTUAL PROPERTY RIGHTS IN SUCH SOFTWARE AND DOCUMENTATION. IF YOU COPY OR USE ALL OR ANY PORTION OF THIS SOFTWARE OR ITS USER DOCUMENTATION WITHOUT ENTERING INTO THIS AGREEMENT OR OTHERWISE OBTAINING WRITTEN PERMISSION OF SYCODE, YOU ARE VIOLATING COPYRIGHT AND OTHER INTELLECTUAL PROPERTY LAW. YOU MAY BE LIABLE TO SYCODE AND ITS LICENSORS FOR DAMAGES, AND YOU MAY BE SUBJECT TO CRIMINAL PENALTIES.

1. DEFINITIONS

1.1 "Access" means to use or benefit from using the functionality of the Software.

1.2 "Computer" means a single electronic device with one or more central processing units (CPUs) that accepts information in digital or similar form and manipulates the information for a specific result based on a sequence of instructions.

1.3 "Install" means to place a copy of Software onto a hard disk or other storage medium through any means (including, but not limited to, use of an installation utility application accompanying the Software).

1.4 "License Parameters" means the definition and limitation of the applicable license scope in Section 2.2 hereof.

1.5 "Permitted Number" means a number relevant for the applicable License Parameters that SYCODE may specify in the applicable User Documentation. The Permitted Number is one (1) unless otherwise provided by SYCODE in writing.

1.6 "Software" means the computer program in which this Agreement is embedded or that is delivered prepackaged with this Agreement.

1.7 "User Documentation" means the explanatory printed or electronic materials that SYCODE or its authorized distributor incorporates in or delivers in or on a package with the Software or sends to You on an invoice, via email, facsimile or otherwise after You acquire or Install the Software, including, but not limited to, license specifications, activation key, license files, instructions on how to use the Software, and/or technical specifications.

1.8 "You" means you personally (i.e., the individual who reads and is prompted to accept this Agreement) if you acquire the Software for yourself or the company or other legal entity for whom you acquire the Software.

2. SOFTWARE LICENSE

2.1 License Grant. SYCODE grants You a non-sublicensable, non-exclusive, non-transferable, limited license to use copies of the Software in the jurisdiction in which you acquire the Software, in accordance with the applicable User Documentation, within the scope of the License Parameters. SYCODE's license grant is conditioned on Your continuous compliance with all license limitations and restrictions described in this Agreement. If You violate any of these limitations or restrictions, the license grant will automatically and immediately expire. The license descriptions in this Section 2 define the scope of rights that SYCODE grants to You. Any usage of the Software outside the scope of the applicable license grant constitutes an infringement of SYCODE's intellectual property rights as well as a material breach of this Agreement.

2.2 License Parameters. SYCODE's license grant is subject to one or more of the License Parameters defined in this Section 2.2 as specified in the User Documentation. Unless SYCODE expressly specifies or agrees otherwise in the User Documentation, all Software shall be governed solely by a license for Standalone (Individual) Versions (see Section 2.2.1).

2.2.1 Standalone (Individual) Version. If SYCODE identifies the Software as a "Standalone Version" or as an "Individual Version" or if the User Documentation does not identify the Software by any of the version designations set forth in Sections 2.2.2 through 2.2.6, You may Install and Access one (1) copy of the Software on one (1) individual Computer, which may not be connected to a network in a manner that allows more than one (1) user to access, upload, operate, view or otherwise create or use a copy of the Software. You may not install or access the Software other than on one (1) computer at a time.

2.2.2 Network Version. If SYCODE identifies the Software as a "Network Version" in the applicable User Documentation, You may Install, Access and use one (1) copy of the Software on Your Computer file server, for Your own internal business needs, with the SYCODE License Manager tool. The Software may be Installed on or Accessed by other Computers, or on an individual Computer, as a multiple-user installation, so long as the

maximum number of concurrent users does not to exceed the Permitted Number.

2.2.3 Educational Institutional Version. If SYCODE identifies the Software as an "Educational Institutional Version" in the applicable User Documentation, You may Install and Access a single copy of the Software on up to the Permitted Number of Computers, only for educational purposes (as further specified in the applicable User Documentation) and for no other purpose. Without limiting the foregoing, Educational Institutional Versions of the Software may not be used for commercial, professional, or for-profit purposes. Additionally, functional limitations apply, as set forth in Section 6.

2.2.4 Student Version. If SYCODE identifies the Software as a "Student Version" in the applicable User Documentation, You may Install and Access a single copy of the Software on up to the Permitted Number of Computers, only for personal learning purposes, and no other purpose. Unless otherwise provided by SYCODE in the User Documentation, Student Versions of the Software may be used for a period of one (1) year from the date of Installation. Without limiting the foregoing, Student Versions of the Software may not be used for commercial, professional or other for-profit purposes and may only be used by persons who qualify as a permitted user of Student Versions (as further specified in the applicable User Documentation for the jurisdiction in which the Software is acquired). Additionally, functional limitations apply, as set forth in Section 6.

2.2.5 Evaluation Version. If SYCODE identifies the Software as a demonstration, evaluation, trial, or not for resale version ("Evaluation Version") in the applicable User Documentation, You may Install and Access one copy of the Software only for the purpose of commercial evaluation and demonstration. Without limiting the foregoing, You may not use it for competitive analysis, or commercial, professional, or for-profit purposes. The Evaluation Version may only be Installed for a ten (10) day evaluation period, unless otherwise specified by SYCODE in writing. Additionally, functional limitations apply, as set forth in Section 6.

2.2.6 License Term. Subject to the terms and conditions of this Agreement, the license to use the Software is perpetual, unless the Software qualifies as an Evaluation Version, Student Version, or is designated as a fixed-term license, a limited duration license or a rental license. In such case, the term of the license shall be the term identified by SYCODE in the applicable User Documentation (the "Designated Term") or the term for which You have paid, whichever is less. If SYCODE identifies the Software as licensed for a fixed term, limited duration or rental and does not specify a term, then the Designated Term shall expire thirty (30) days after the date You first Install the Software. Use of this Software beyond the applicable license term, or any attempt to defeat the time-control disabling function in the Software is an unauthorized use and constitutes a material violation of this Agreement and intellectual property law.

2.3 Software Components. The Software is licensed to You as a single product and its components may not be separated for distribution or use on more than one (1) Computer unless expressly permitted by SYCODE in the applicable User Documentation.

3. PERMITTED AND PROHIBITED ACTIONS

3.1 Permitted Actions

3.1.1 Backup Copy. Regardless of which version of the Software You have acquired, You may Install one archival (backup) copy of the Software. Such archival copy may not be

Installed on another Computer, unless such other Computer is a partitioned drive of a server to which only the user of the active copy of the Software can Access. In any event, the archival copy may not be Accessed as long as another copy of the Software is Installed on any Computer. Except as expressly permitted under Section 2.2: (a) if the User Documentation is in printed form, it may not be copied; and (b) if the User Documentation is in electronic form, it may not be duplicated electronically.

3.1.2 Additional Installation. Except with regard to Educational Institutional, Student and Evaluation Versions only, You may Install and Access a second copy of the Software on the hard disk of a second Computer owned by You or under Your control provided that:

(i) the original and second copies are used only by the same person;

(ii) the second copy is Installed and Accessed only on either (a) with respect to Network Versions, a redundant server that makes the Software available for use only when Your primary server on which the active Software copy is Installed becomes inoperable, or (b) a notebook computer or other non-server computer away from Your usual work location for the purpose of enabling You to perform work while away from Your usual work location;

(iii) only one of the Software copies is Accessed at any one time; and

(iv) both copies of the Software are Installed and Accessed exclusively with the copy protection device (if any) supplied with the Software.

(v) You have an active Subscription for the Software.

3.2 Prohibited Actions. SYCODE does not permit any of the following actions and You acknowledge that such actions shall be prohibited:

3.2.1 Use. You may not Install, Access or otherwise copy or use the Software or User Documentation except as expressly authorized by this Agreement.

3.2.2 Reverse Engineering. You may not reverse engineer, decompile, or disassemble the Software.

3.2.3 Transfers. You may not distribute, rent, loan, lease, sell, sublicense, or otherwise transfer all or any portion of the Software or User Documentation, or any rights granted in this Agreement, to any other person without the prior written consent of SYCODE.

3.2.4 Hosting or Third Party Use. You may not Install or Access, or allow the Installation or Access of, the Software over the Internet, including, without limitation, use in connection with a Web hosting or similar service, or make the Software available to third parties via the Internet on Your computer system or otherwise.

3.2.5 Distribution. You may not distribute the Software to another party, without prior written permission from SYCODE. Distribution includes, but is not limited to, sending the Software by electronic mail, placing the Software on a web server or a similar on-line source, including the software on a CD or any other media or any other distribution mechanism.

3.2.6 Notices. You may not remove, alter, or obscure any proprietary notices, labels, or marks from the Software or User Documentation.

3.2.7 Modifications. You may not modify, translate, adapt, arrange, or create derivative works based on the Software or User Documentation for any purpose.

3.2.8 Circumvention. You may not utilize any equipment, device, software, or other means designed to circumvent or remove any form of copy protection used by SYCODE in connection with the Software, or use the Software together with any, activation code, serial number, or other copy protection device not supplied by SYCODE directly or through an authorized distributor.

3.2.9 Export. You may not export the Software or User Documentation in violation of this Agreement, Indian or other applicable export control laws.

4. ALL RIGHTS RESERVED

Except as expressly provided otherwise in this Agreement, title, ownership and all rights and interest including, without limitation, copyrights, in and to the Software and User Documentation and any authorized copies made by You remain with SYCODE and its licensors. The structure, organization, and code of the Software are valuable trade secrets of SYCODE and its licensors and You shall keep such trade secrets confidential. The Software and User Documentation are licensed, not sold.

5. DISCLAIMER

ANY STATEMENTS OR REPRESENTATIONS ABOUT THE SOFTWARE AND ITS FUNCTIONALITY IN THE USER DOCUMENTATION OR ANY COMMUNICATION WITH YOU CONSTITUTE TECHNICAL INFORMATION AND NOT AN EXPRESS WARRANTY OR GUARANTEE. IN ADDITION, SYCODE SPECIFICALLY DISCLAIMS ANY OTHER WARRANTY INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. WITHOUT LIMITING THE FOREGOING, SYCODE DOES NOT WARRANT THAT THE OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR FREE.

6. WARNINGS

6.1 Functionality Limitations. COMPUTER AIDED DESIGN SOFTWARE AND OTHER TECHNICAL SOFTWARE ARE TOOLS INTENDED TO BE USED BY TRAINED PROFESSIONALS ONLY. THEY ARE NOT SUBSTITUTES FOR YOUR PROFESSIONAL JUDGMENT. COMPUTER AIDED DESIGN SOFTWARE AND OTHER TECHNICAL SOFTWARE ARE INTENDED TO ASSIST WITH PRODUCT DESIGN AND ARE NOT SUBSTITUTES FOR INDEPENDENT TESTING OF PRODUCT STRESS, SAFETY AND UTILITY. DUE TO THE LARGE VARIETY OF POTENTIAL APPLICATIONS FOR THE SOFTWARE, THE SOFTWARE HAS NOT BEEN TESTED IN ALL SITUATIONS UNDER WHICH IT MAY BE USED. SYCODE SHALL NOT BE LIABLE IN ANY MANNER WHATSOEVER FOR THE RESULTS OBTAINED THROUGH THE USE OF THE SOFTWARE. PERSONS USING THE SOFTWARE ARE RESPONSIBLE FOR THE SUPERVISION, MANAGEMENT AND CONTROL OF THE SOFTWARE. THIS RESPONSIBILITY INCLUDES, BUT IS NOT LIMITED TO, THE DETERMINATION OF APPROPRIATE USES FOR THE SOFTWARE AND THE SELECTION OF THE SOFTWARE AND OTHER PROGRAMS TO ACHIEVE INTENDED RESULTS. PERSONS USING THE SOFTWARE ARE ALSO RESPONSIBLE FOR ESTABLISHING THE ADEQUACY OF INDEPENDENT PROCEDURES FOR TESTING THE RELIABILITY AND ACCURACY OF ANY

PROGRAM OUTPUT, INCLUDING ALL ITEMS DESIGNED BY USING THE SOFTWARE.

6.2 Activation Key Required.

6.2.1 INSTALLATION, ACCESS, TRANSFERS AND CONTINUED USE OF THE SOFTWARE MAY REQUIRE AN ACTIVATION KEY. YOU MUST REGISTER YOUR ACQUISITION OF THE SOFTWARE WITH SYCODE BEFORE AN ACTIVATION KEY IS ISSUED TO YOU.

6.2.2 THE ACTIVATION SECURITY MECHANISMS MAY DISABLE THE SOFTWARE IF YOU TRY TO TRANSFER IT TO ANOTHER COMPUTER, IF YOU TAMPER WITH THE DATE SETTING MECHANISMS ON YOUR COMPUTER, IF YOU USE THE SOFTWARE PAST AN APPLICABLE EVALUATION PERIOD OR LIMITED TERM, OR IF YOU UNDERTAKE CERTAIN OTHER ACTIONS THAT MAY OFFSET THE SECURITY MODE. MORE INFORMATION IS CONTAINED IN THE APPLICABLE USER DOCUMENTATION OR AVAILABLE FROM SYCODE ON REQUEST.

7. LIMITATION OF LIABILITY

IN NO EVENT SHALL SYCODE OR ITS LICENSORS HAVE ANY LIABILITY FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, REVENUE, DATA, OR COST OF COVER. IN ADDITION, IN NO EVENT SHALL THE LIABILITY OF SYCODE OR ITS LICENSORS FOR ANY DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THIS AGREEMENT EXCEED THE AMOUNT PAID OR PAYABLE BY YOU FOR THE SOFTWARE PRINCIPALLY RESPONSIBLE FOR SUCH DAMAGES. THE LIMITATIONS OF LIABILITY IN THIS SECTION 7 SHALL APPLY TO ANY DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, WHETHER DERIVED FROM CONTRACT, TORT (INCLUDING, BUT NOT LIMITED TO, NEGLIGENCE), OR OTHERWISE, EVEN IF SYCODE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND REGARDLESS OF WHETHER THE LIMITED REMEDIES AVAILABLE HEREUNDER FAIL OF THEIR ESSENTIAL PURPOSE.

8. GENERAL

8.1. No Assignment; Insolvency. This Agreement and any rights hereunder are non-assignable and any purported assignment shall be void. The Agreement and the licenses granted hereunder shall terminate without further notice or action by SYCODE if You become bankrupt or insolvent, make an arrangement with Your creditors or go into liquidation.

8.2. Choice of Law. This Agreement and any disputes arising out of or in connection with this Agreement shall be governed by the laws of the state of Goa in India without reference to conflict-of-laws principles and excluding the UN Convention on Contracts for the International Sale of Goods.

8.3 Entire Agreement. This Agreement and the applicable User Documentation constitute the entire agreement between You and SYCODE and supersede any other previous or contemporaneous communications, agreements, representations, or advertising with respect to the Software and User Documentation.

8.4 Severability. If and to the extent any provision of this Agreement is held illegal,

invalid, or unenforceable in whole or in part under applicable law, such provision or such portion thereof shall be ineffective as to the jurisdiction in which it is illegal, invalid, or unenforceable to the extent of its illegality, invalidity, or unenforceability and shall be deemed modified to the extent necessary to conform to applicable law so as to give the maximum effect to the intent of the parties. The illegality, invalidity, or unenforceability of such provision in that jurisdiction shall not in any way affect the legality, validity, or enforceability of any other provision of this Agreement in any other jurisdiction.

8.5 Audits. To ensure compliance with this Agreement, You agree that upon reasonable notice, SYCODE or SYCODE's authorized representative shall have the right in inspect and audit Your Installation, Access and use of the Software. Any such inspection or audit shall be conducted during regular business hours at Your facilities or electronically. If such inspections or audits disclose that You have Installed, Accessed or permitted Access to the Software on Computer(s) in a manner that is not permitted under this Agreement, then SYCODE may terminate this Agreement immediately and You are liable to pay for any unpaid license fees as well as the reasonable costs of the audit. Nothing in this section shall be deemed to limit any legal or equitable remedies available to SYCODE for violation of this Agreement or applicable law.

8.6 Language. The English language version of this Agreement is legally binding in case of any inconsistencies between the English version and any translations.

Command Reference

TerrainCAD for Rhino adds a new submenu to the Rhino menu called 'TerrainCAD'. The TerrainCAD menu consists of the following commands:

TCImportPoints	Import points from a text file
TCCreateTerrain	Create a mesh from a set of unordered points
TCSolidifyTerrain	Solidifies a terrain
TCHelp	Displays the *TerrainCAD for Rhino* help file
TCRegister	Registers your copy of *TerrainCAD for Rhino*
TCAbout	Displays the *TerrainCAD for Rhino* about box

TCImportPoints

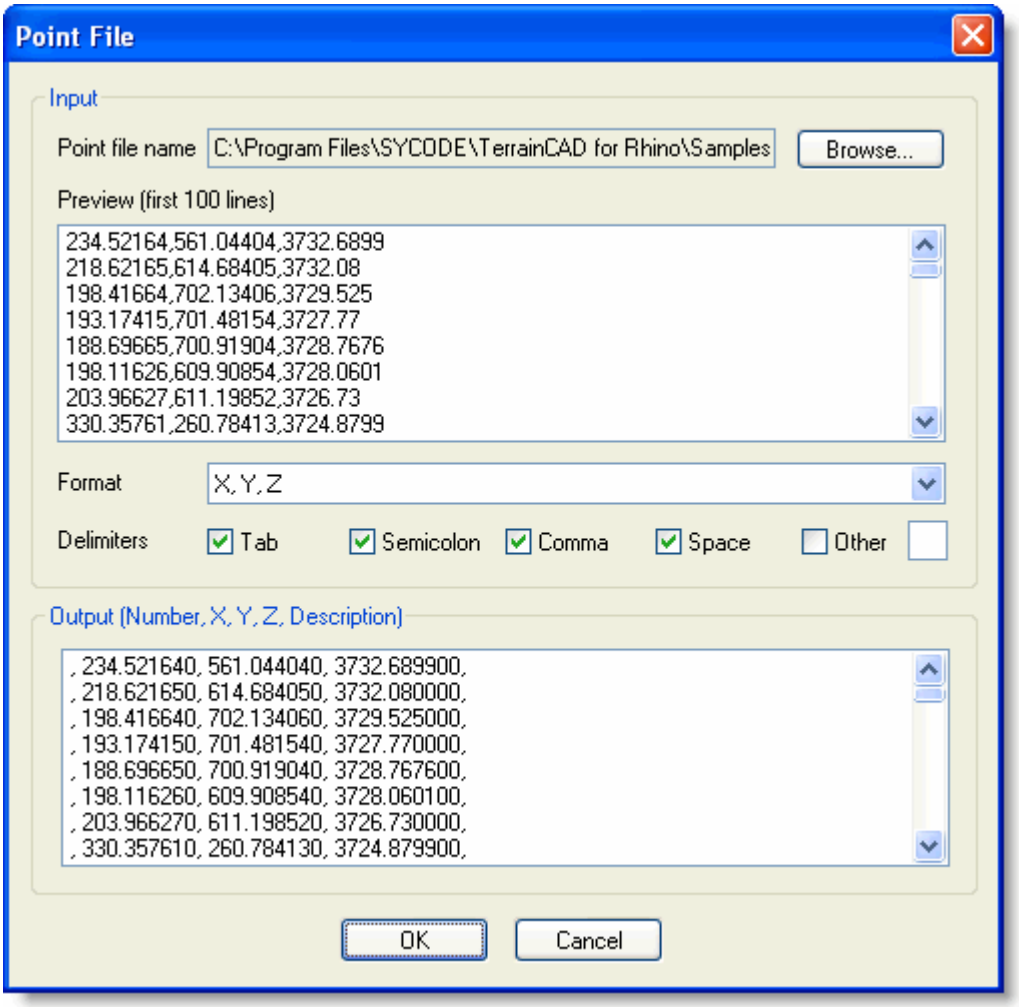
Menu Button TerrainCAD > Import Points
Command TCImportPoints

This command imports points from a text file. This command invokes the Point File dialog (shown below) which allows you to select the point file to import and set the file format and delimiters.

To import Points

1. Click *Import Points* from the *TerrainCAD* menu or type *TCImportPoints* at the Rhino command prompt.

2. The *Point File* dialog box is displayed. Browse for the Point file you wish to import. At the Open dialog box select the file and click *Open*. Select the format and delimiters in the Point File dialog box and click *OK*.



Explanation

Format
Each line of the text file is assumed to contain data related to a single point. The point data must contain the X, Y and Z coordinates of the point and may contain a point number and point description. The point number (if it exists) must be present before and coordinate data and the point description (if it exists) must be present after the coordinate data. The point coordinates can be in the X, Y, Z format or the Northing, Easting, Elevation (Y, X, Z) format. The general format can be described as:

[Point Number] [Point Coordinates] [Point Description]

Delimiters
The most commonly used delimiters are Tab, Semicolon, Comma and Space. You can specify a custom delimiter as well.

How it works
Browse for the text file by clicking the "Browse" button. After selecting the text file the Preview list box will show you the first 100 lines of the text file. Then proceed to select the format of the text file by selecting the appropriate value from the Format drop list. Also select/unselect the delimiters. The output list box will show you the points read from the text file based on the current values of format and delimiters. When you are satisfied with the contents of the output list box click the OK button and the points will be imported into Rhino.

Note:

- Point numbers and descriptions are not imported.

TCCreateTerrain

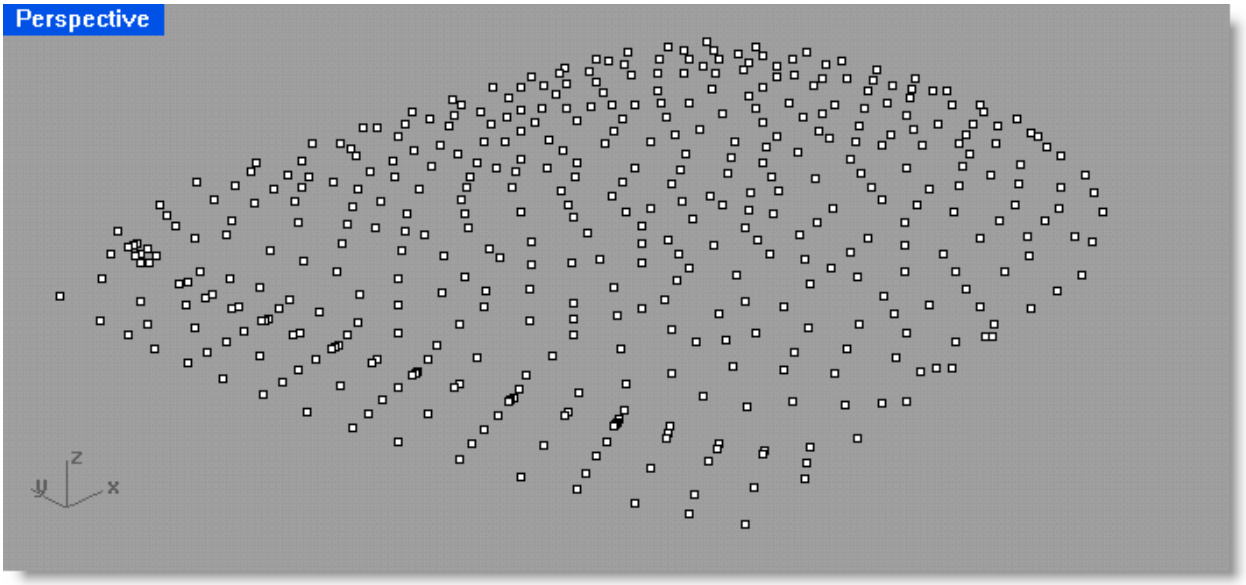
Menu Button	TerrainCAD > Create Terrain
Command Name	TCCreateTerrain

This command creates a terrain mesh from a set of unordered survey points, contours and polylines. The mesh is created as a Delaunay Triangulation.

The mesh topology can be adjusted by using a search radius. The search radius determines whether two points can be part of the same triangular face. If the distance between two points is larger than the search radius then they are not connected by a face. This is particularly useful when creating a mesh from a set of points that has a concave boundary

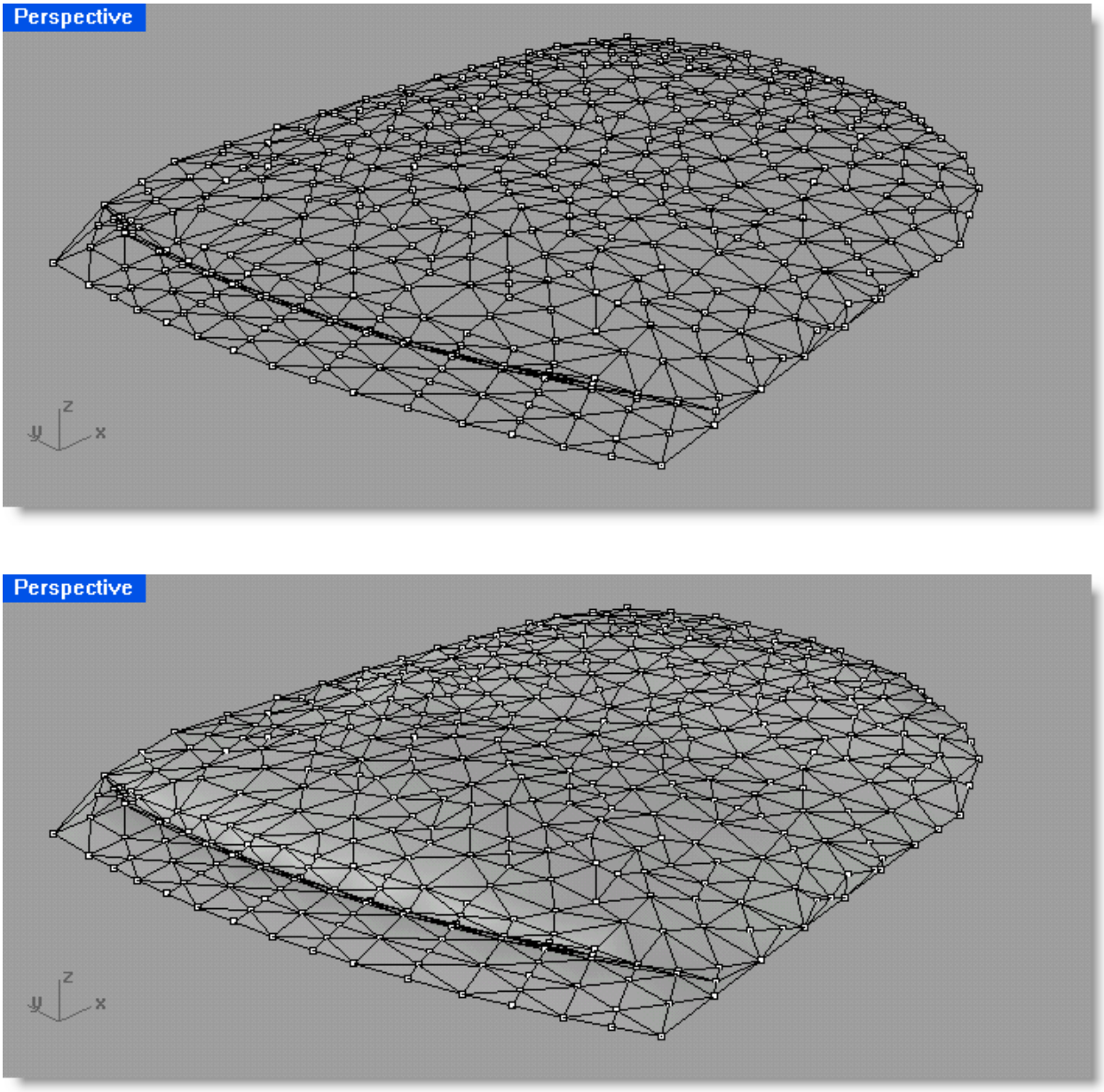
To create a Terrain

1. Click *Create Terrain* from the *TerrainCAD* menu or type *TCCreateTerrain* at the Rhino command prompt.
2. At the *Select points, lines and polylines* prompt, select the points and press *Enter*.
3. At the *Search radius* prompt, set the search radius.



The figure above shows a set of unordered points.

The figure below shows a mesh created from the unordered points that satisfies the Delaunay Triangulation criteria.



Shaded view of the terrain mesh

Note:

- A search radius of zero will remove the connectivity constraint and all points will be connected however far they may be from each other.
- Breaklines and/or contours can be modified by typing or selecting the appropriate options. This may be helpful in analyzing the effect of breaklines/contours on the terrain.

TCSolidifyTerrain

Menu Button	TerrainCAD > Import Points
Command	TCSolidifyTerrain

This command is used to create a solid from the terrain mesh by giving it thickness.

The terrain is an open mesh, which means that it bounded by boundary edges. In order to build a model of the terrain by rapid prototyping or similar processes, it becomes necessary to give the mesh surface a volume.

To Solidify a terrain:

1. Carry out steps 1 to 6 in Tutorial 1.

2. Select *Solidify Terrain* from the "TerrainCAD" submenu or type *TCSolidifyTerrain* at the Rhino command prompt and press *Enter.*

3. At the Rhino command prompt *Select terrain meshes to solidify,* select all the meshes and press *Enter.*

4. At the "TerrainCAD" option command prompt set the option as required and press *Enter*.

The mesh is solidified by a specified depth. The bottom of the solidified mesh can be flat or exactly the same as the top surface. When a flat bottom is chosen the depth is measured from the lowest vertex of the original terrain. When a flat bottom is not chosen, the bottom surface is same as the top surface and below it at the distance specified by the depth.

The figure below shows a terrain.

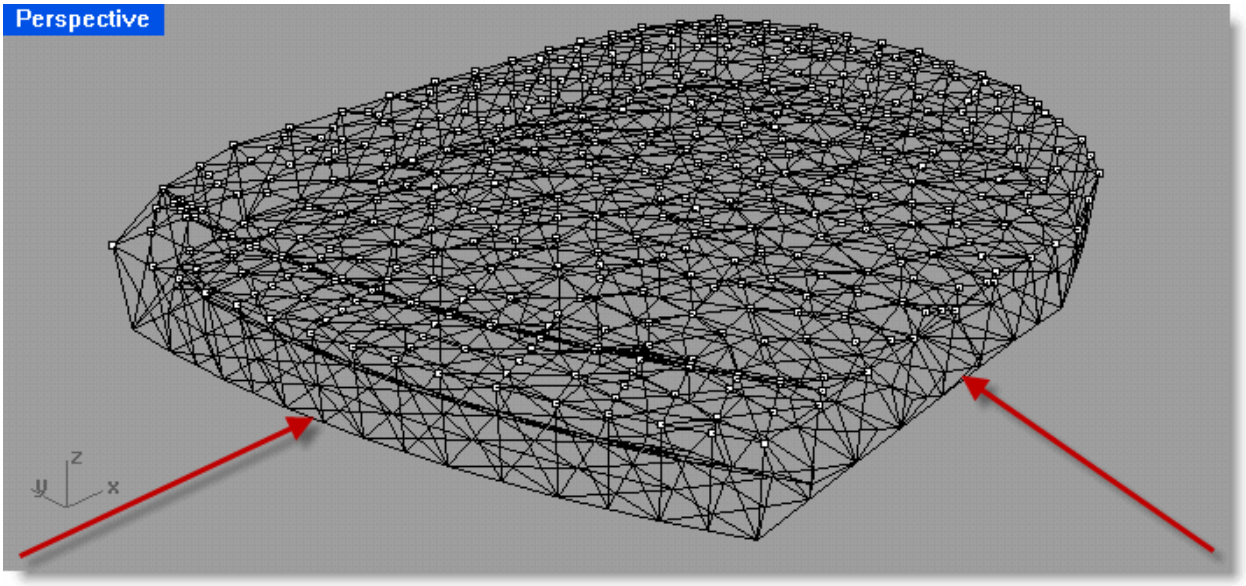


Fig. 1

The figure below shows the above terrain solidified to a depth of 70 with a flat bottom.

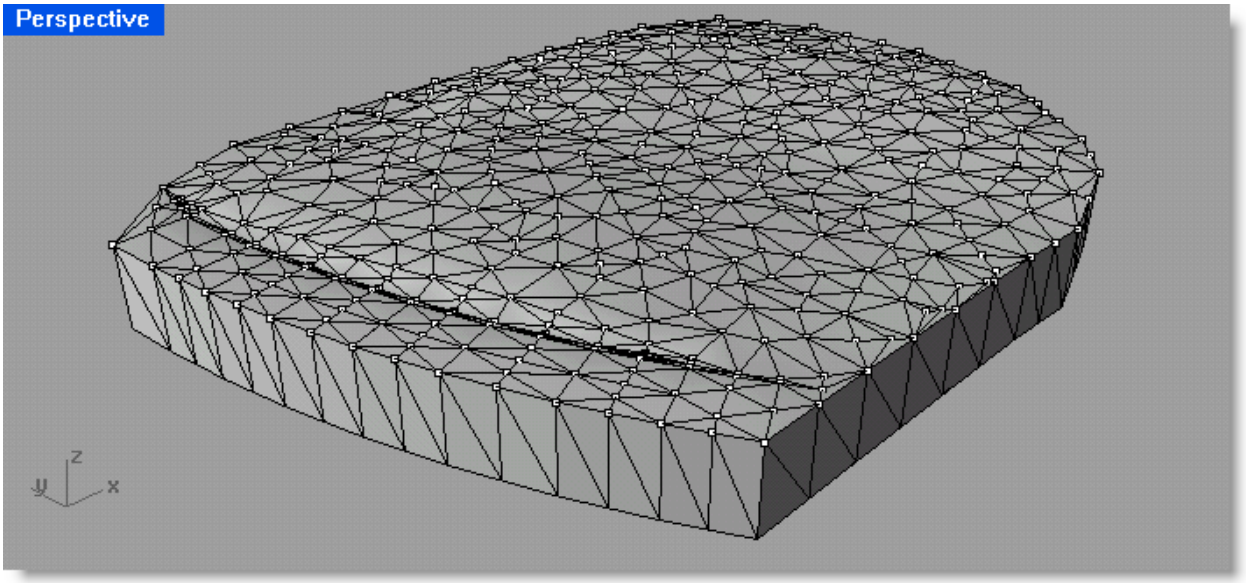


Fig. 2

Note: Solidification is usually the last command while editing a terrain. Most of the other commands will not work properly once the terrain is solidified. This is because almost all commands assume that the terrain is an open mesh.

TCHelp

Menu Button	TerrainCAD > Help
Command	TCHelp

This command displays the help file. The Welcome page is a good place to start.

TCAbout

Menu Button TerrainCAD > About
Command TCAbout

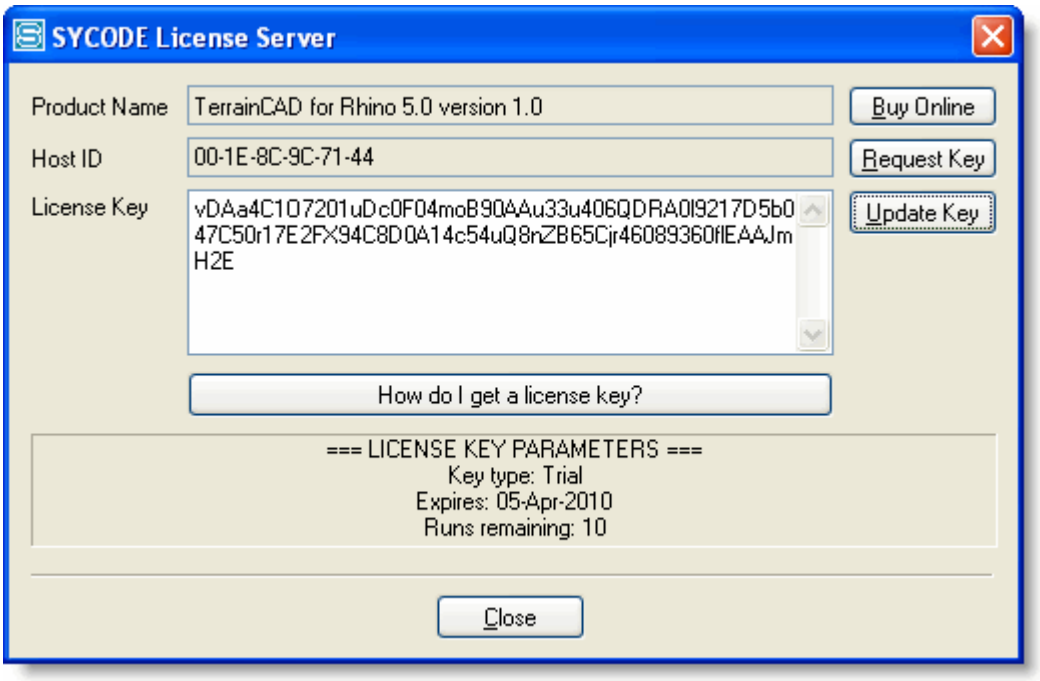
This command displays the *TerrainCAD for Rhino* about box. The about box lists the software and its version.

TCRegister

Menu Button	TerrainCAD > Register
Command	TCRegister

This command is used to register your copy of *TerrainCAD for Rhino*

You need a license key to start using the software. A license key can be of two types: Trial or Permanent. A trial key is issued to you instantly and completely free of cost so that you may try the software before you purchase a license. A permanent key is issued after you have purchased a license.



How do I get a Trial Key?

Simply click the 'Request Key' button and select 'TRIAL KEY' as the type of key being requested. Fill the form and submit it. A trial key will be immediately sent to you by email.

How do I get a Permanent Key?

To get a permanent key you need to have already purchased a license. If you have not yet purchased a license you can do so by clicking the 'Buy Online' button. After you place your order click the 'Request Key' button and select 'PERMANENT KEY' as the type of key being requested. Fill the form and submit it. Your order will be verified and a permanent key will be sent to you by email within one business day.

IMPORTANT:
(1) Please ensure that your computer is connected to the internet before you request for a key.
(2) Please be sure to enter a valid email address as the key will be sent to you by email.

(3) To avoid disruption in your work-flow we urge you to place your order before the trial period ends.

If you need anything else please send an email to register@sycode.com

Tutorials

Using *TerrainCAD for Rhino* is as easy as selecting points. The purpose of these tutorials is to provide the necessary information and hands-on experience to enable you to create meshes using *TerrainCAD for Rhino*

The tutorials are designed to get you started with *TerrainCAD for Rhino* in the shortest possible time.

- **Tutorial 1:** Create a terrain mesh from points
- **Tutorial 2:** Effect of search radius

Note:

- The files used in these tutorials can be found in the Samples folder. (Typically C:\Program Files\SYCODE\TerrainCAD for Rhino\Samples\)

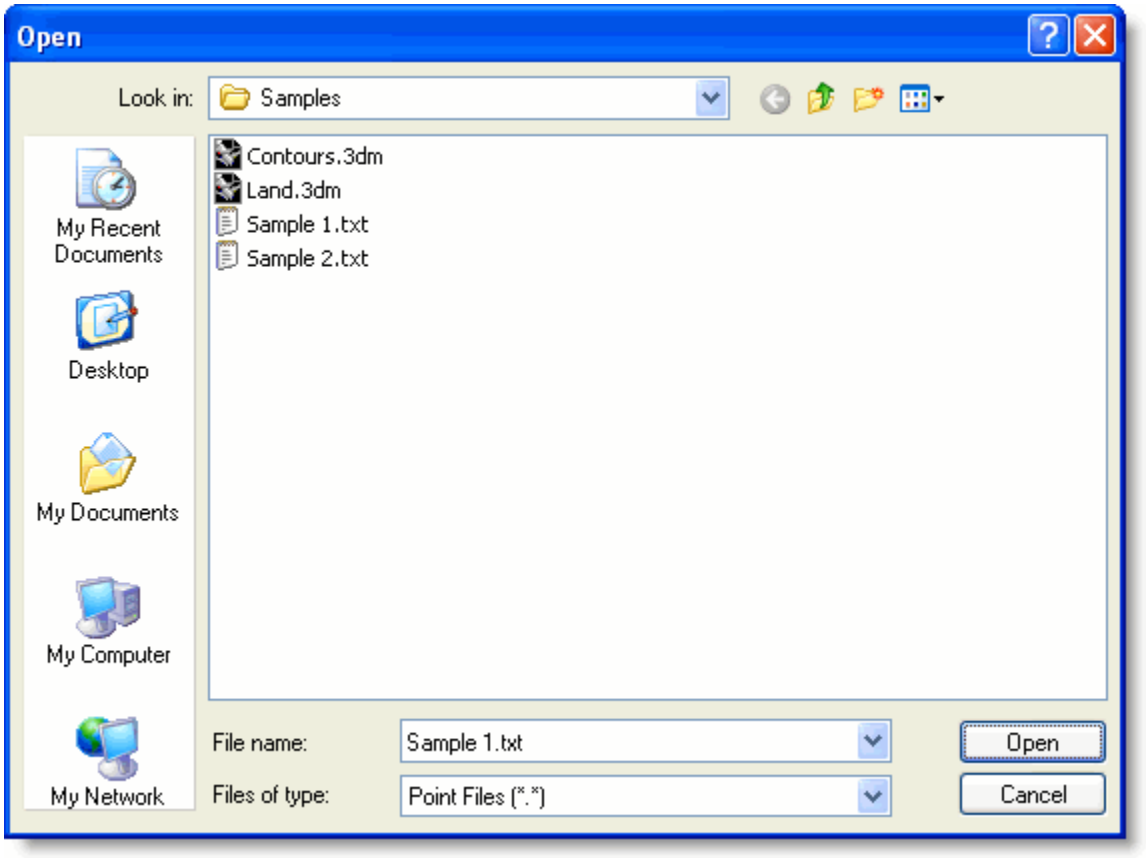
Tutorial 1 - Create a terrain mesh from points

In this tutorial we will learn how to create a terrain mesh from a set of unordered points.

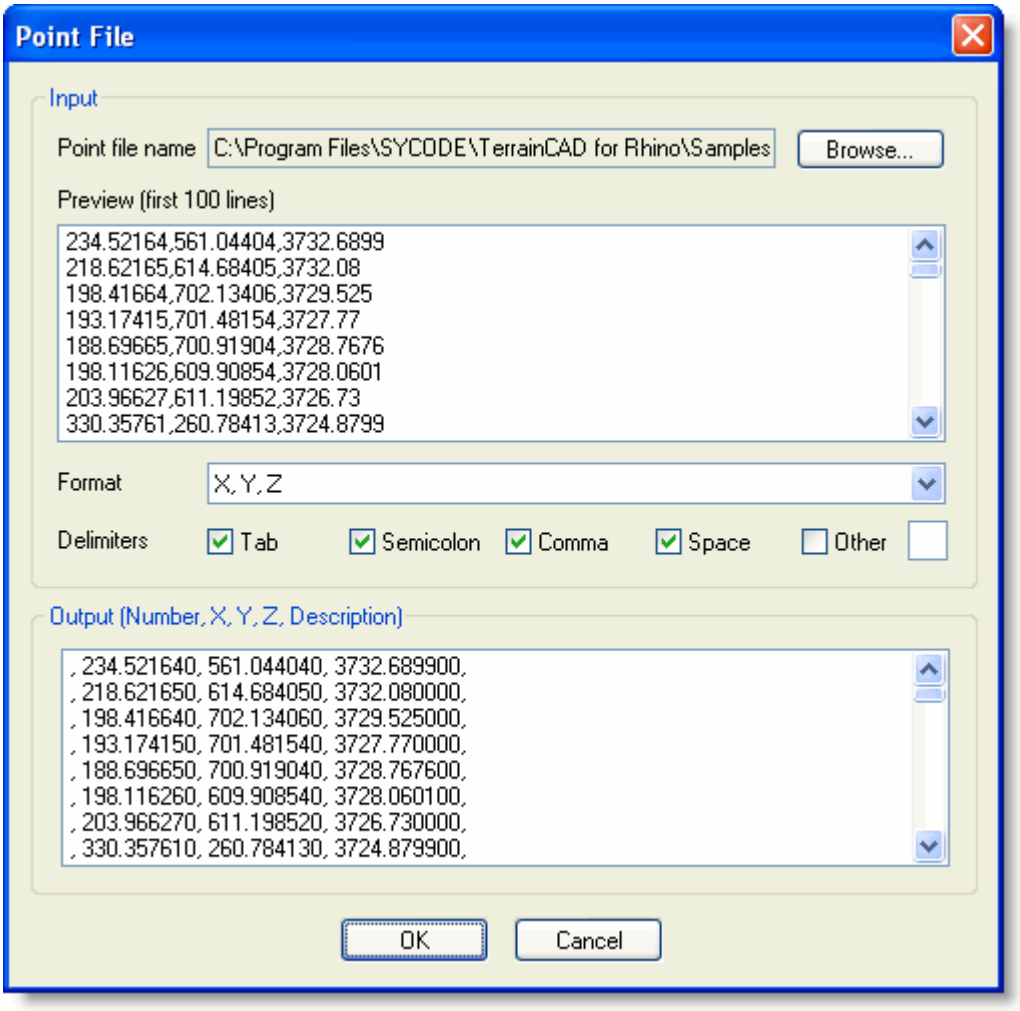
Step 1: Start Rhino.

Step 2: Select *Import Points* from the *TerrainCAD* menu or type *TCImportPoints* at the Rhino command prompt and press *Enter.*

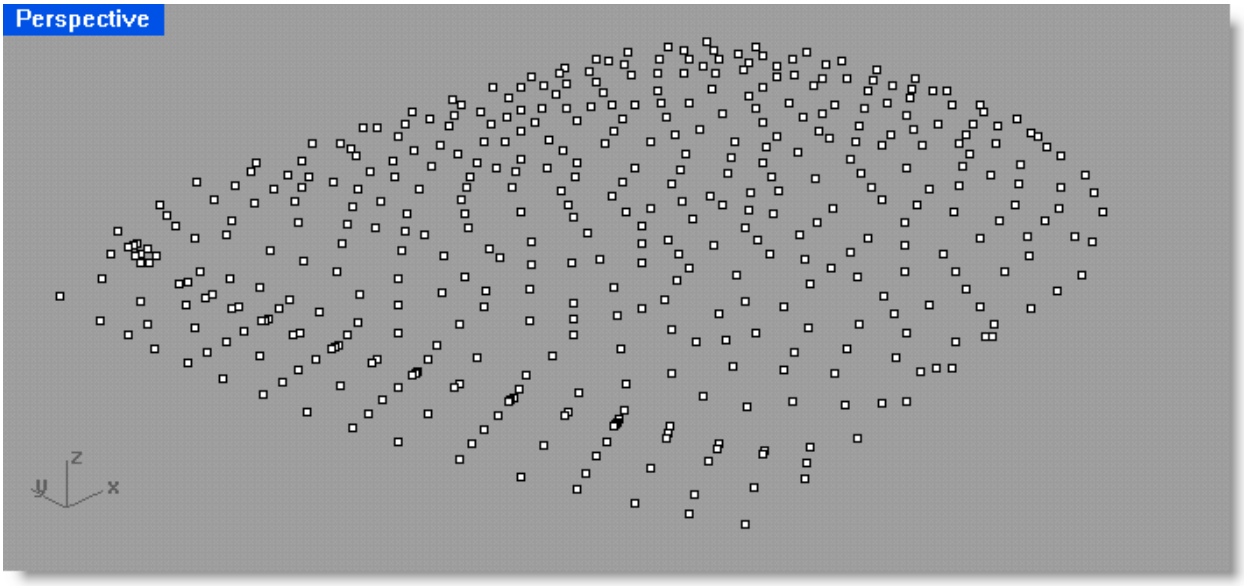
Step 3: The *Point File* dialog box is displayed. Browse for the file C:\Program Files\SYCODE\TerrainCAD for Rhino\Samples\Sample1.txt and click *Open* from the *Open* dialog box**.**



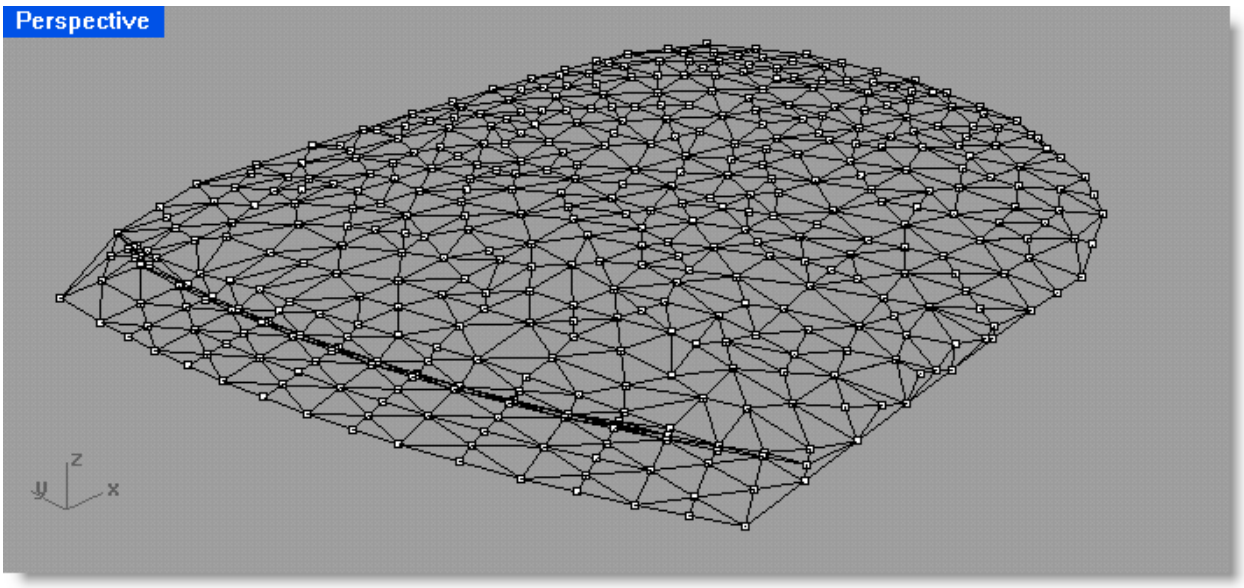
Step 4: Select the format and delimiters in the Point File dialog box and click *OK***.**

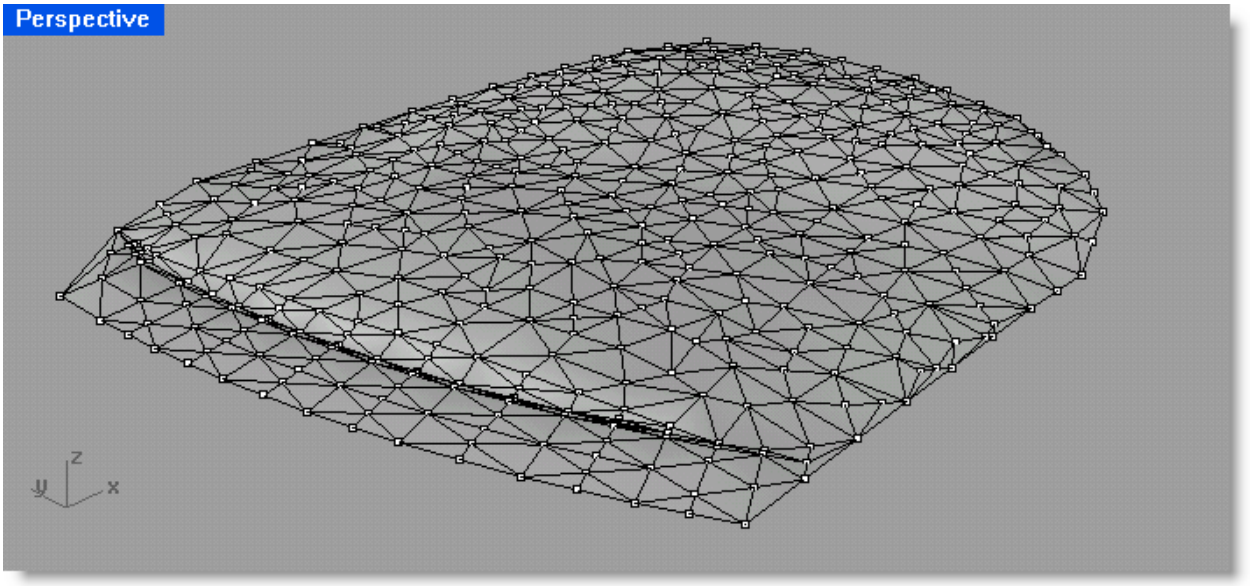


Step 5: Zoom to the extents of the drawing (View->Zoom->Extents). You will find the points from *Sample1.txt* imported into the current drawing.



Step 6: Select *Create Terrain* from the *TerrainCAD* menu or type *TCCreateTerrain* at the Rhino command prompt and press *Enter.* At the Rhino command prompt *select points, contours and breaklines*, select all the points and press *Enter*. When prompted for the search radius type *0* press *Enter*. A mesh is created as shown below.





Shaded view of the terrain mesh

A terrain mesh is created using the current object creation parameters (color, layer, etc.) and the result of the operation is reported in the command window.
In this tutorial we specified a search radius of zero, which means that the search radius should be ignored when creating the terrain mesh. In the next tutorial we shall specify a valid search radius and study its effect on the shape of the terrain mesh.

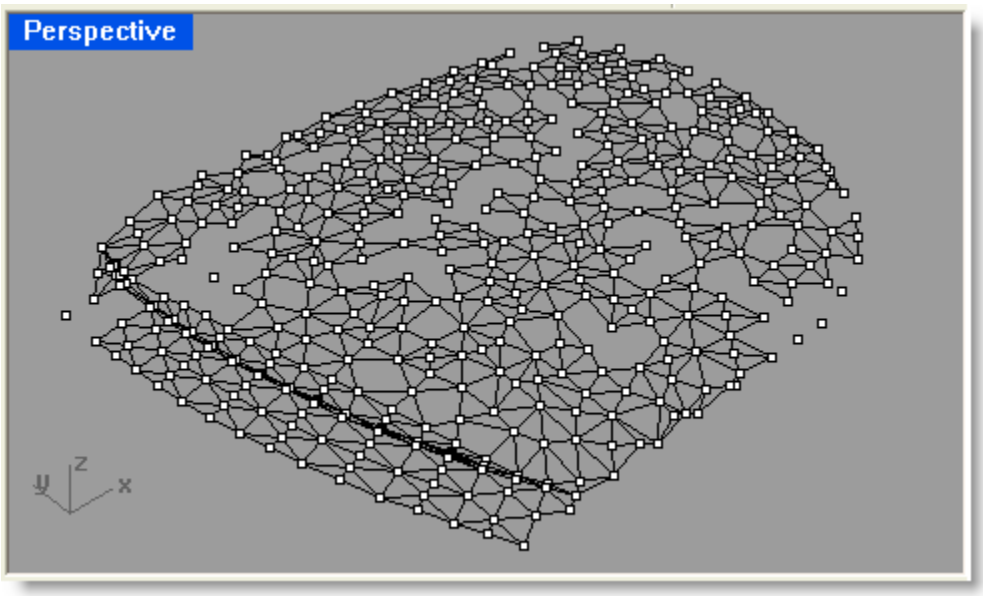
Tutorial 2 - Effect of search radius

Tutorial 2 - Effect of search radius

In this tutorial we will study the effect of the search radius parameter on the terrain mesh.

Step 1: Delete the terrain mesh created in Tutorial 1. If you are starting from scratch then carry out steps 1 to 5 in Tutorial 1.

Step 2: Select *Create Terrain* from the *TerrainCAD* menu or type *TCCreateTerrain* at the Rhino command prompt and press *Enter.* At the Rhino command prompt *select points, contours and breaklines*, select all the points and press *Enter*. Specify a search radius of 50 and press *Enter*. A mesh is created as shown below.

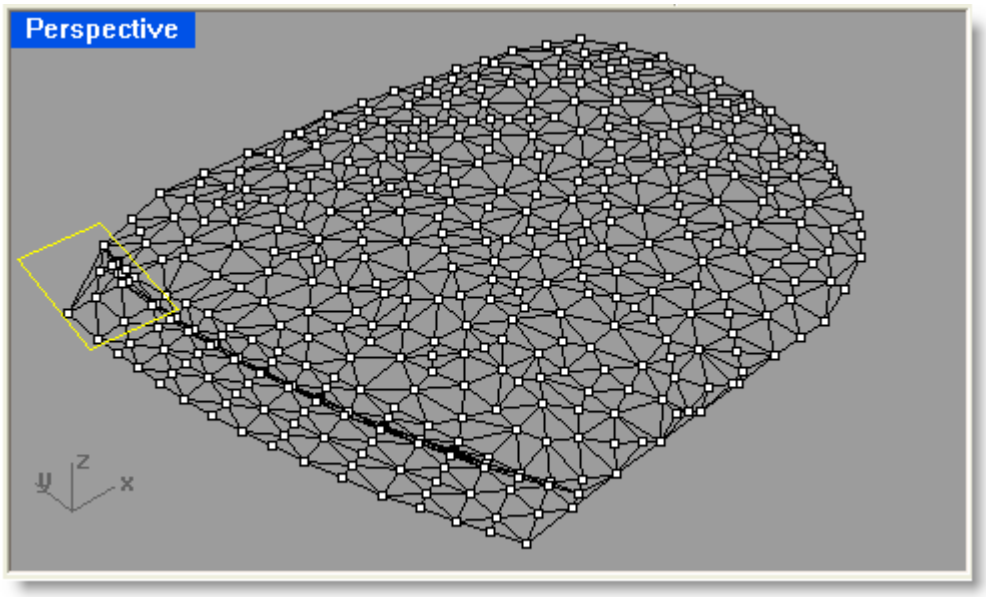


Terrain mesh with holes

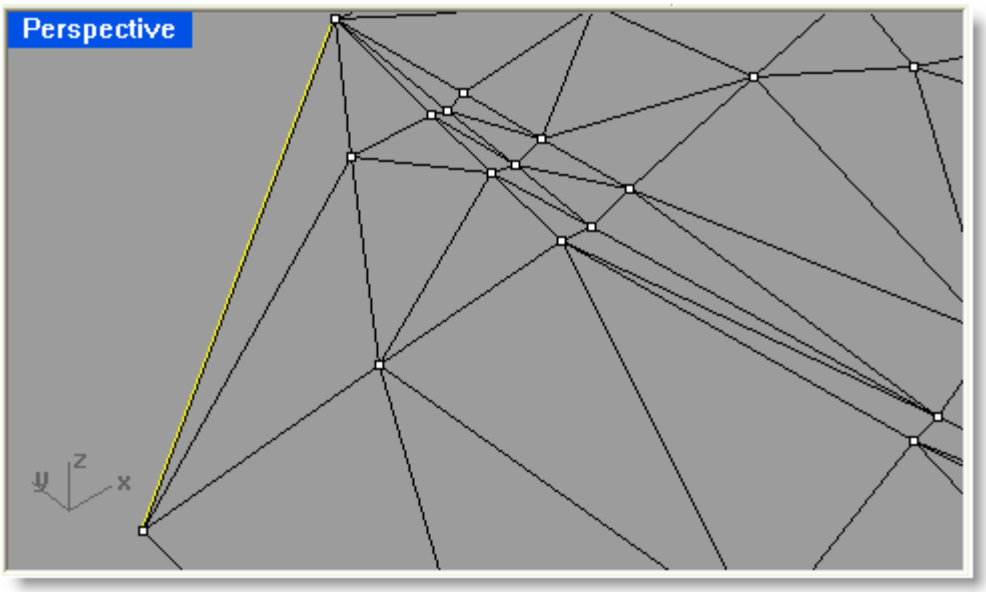
You will find that the terrain mesh created has holes in it and is incomplete (see figure above). This is because the search radius we specified is not large enough.

Step 3: Use Rhino's Undo command to undo the creation of the terrain mesh. Carry out the 2 step again and this time set the search radius to 70. The terrain mesh created this time does not have holes.
This brings about an interesting question. Why don't we always set the search radius to a very large value (say 99999999) or zero (which is equivalent to a very large number since the search radius parameter is ignored for a value equal to zero)? The answer is we can't always do that because this may result in a terrain mesh which contains unwanted triangular faces. In fact the search radius parameter is prevents the generation of these unwanted faces. Lets see what unwanted faces are by an example.

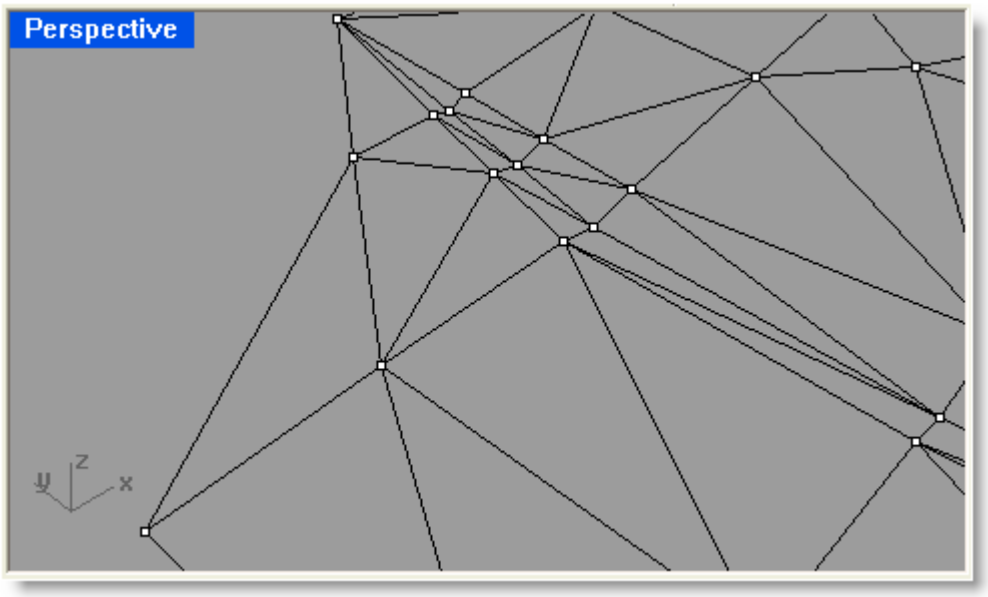
Step 4: Delete the terrain mesh and create it again by following the above steps using the TerrainCAD command with a search radius of zero. A terrain mesh will be created containing 829 faces (see message in the command window) as shown below. Zoom into the area marked in red.



The boundary points (highlighted in red) are joined by unwanted needle shaped triangular faces. This happens because the boundary points in this point set do not describe a convex polygon. As a result the meshing algorithm treats all points as possible mesh edges and creates faces where it can.



Now delete the terrain mesh and create it again using a search radius of 70. This time the terrain mesh contains 828 triangular faces (1 face lesser). The unwanted needle shaped triangular faces are no longer present in the terrain mesh (see figure below).



An intelligent use of the search radius parameter can yield accurate terrain meshes.