

# TerraStereo Quick Guide

## Tools Overview

### TerraStereo for CAD

TerraStereo for CAD will turn MicroStation into a stereo CAD using Microstation views 7 and 8 to make a stereo view on a passive two-screen stereo display. It runs on Bentley MicroStation CE or Bentley Map PowerView CE.

The application is loaded like any mdl application, for instance by a key-in <mdl load tstereo>.

### TerraStereo Standalone Application

For viewing, inspecting and simple digitizing from point clouds in stereo. This is a quad buffered version of TerraStereo that runs without MicroStation.

It uses same projects for point clouds that TerraStereo for CAD but cannot be run at the same time since it uses a different display mode that needs to be changed by the user.

### FixScreens Utility

This helper application is needed with TerraStereo for CAD. It will set MicroStation application windows (not views) so that they are properly positioned for the stereo usage. It is installed into terra64/tstereo -folder. This utility is needed during initial configuration of TerraStereo for CAD (before the settings are saved in Microstation) and/or if the monitors are shut down for some reason in the middle of the operations.

Note – currently the command does not affect those windows that are minimized –they will remain minimized and once restored they will relocate to their original places. In this case just rerun the fixScreens utility.

## Tools Setup

The display numbering referenced in the setup instructions goes from left to right (1 being the top monitor (right eye), 2 being the bottom monitor (left eye) and 3 being the side monitor located to the right). The actual numbers in the workstation can be different but the order of the displays need to remain as described here.

For the first time setup, please execute setup.bat (it checks for required runtime environments first). For further updates, executing terrasw.exe will suffice. Both methods install both TerraStereo for CAD and TerraStereo standalone. If there is no Microstation installed in the machine, leave Microstation location field empty and ignore the error prompt from the setup. In this case, only TerraStereo standalone is installed.

### TerraStereo for CAD First Time Configuration

The display mode (from the windows desktop) should be set so that displays 1, 2 and 3 extend the desktop. Currently only a homogenous resolution is supported, so all monitors should have the same resolution (eg. 4k). Stereo monitors should also have the same refresh rate (eg. @60Hz).

MicroStation should be opened with 3 application windows (configurable via MicroStation File/Settings/User/Operation/Open Multiple Application Windows). After configuring the amount of application windows, a restart for MicroStation is required.

After restarting MicroStation, open a design file before continuing to next step. Initially the three application windows will be randomly opened to the screens.

Run fixScreens.exe -utility to organize the application windows of the MicroStation.

Make sure the setup after fixScreens.exe is right; application window #2 of MS is the bottom monitor and window #3 of MS is the top. Window #1 is the side monitor. The application window number is visible from the MicroStation Window title bar (see image below for #2).



To start TerraStereo for CAD load it like any other mdl application with a name <tstereo>.

Note that applications requiring quad buffered stereo cannot be run at the same time with TerraStereo for CAD. To start these applications close MicroStation first and then set the display mode so that displays 1 and 2 duplicate each other before starting quad buffer stereo applications.

In order to resume to work without need to rerun fixScreens save the settings in MicroStation and close it. Next time you start MicroStation the application windows should already be in right places.

### TerraStereo Standalone First Time Configuration

The standalone TerraStereo requires display mode to be set so that displays 1 and 2 duplicate the desktop. The desktop should also be set to operate on 3D mode. A quad buffered graphics board is required to run the standalone application in stereo mode. If the display settings are not right the application reverts to anaglyph stereo mode.

The software is started from the file explorer by running tstereo.exe from the terra64/tstereo - folder.

## Quick Start - TerraStereo for CAD

### Viewing Vectors in Stereo

You should be able to view any vectors drawn in Microstation in stereo mode. To start, set view 7 to use normal camera, rotate view to top orientation and then fit it. Then remove the clipping (using TerraStereo Clipping Reset) before navigating the view. TerraStereo automatically copies all view geometry from view 7 (left eye) to view8 (right eye). You need to manually make sure that all required levels are set similarly to both views and that their rendering styles are equal.

Before navigating the view take a tentative point on somewhere on the model to see the cross hair properly.

### Getting the Points into Stereo View

When TerraStereo is loaded, it will automatically setup views for stereo –operation so that view 7 is on screen2 and view 8 is on screen3 of Microstation.

Load some points into the memory using TerraScan. If the design file is empty, draw borders around the loaded points by TerraScan tools/Draw Bounding Box –command.

Then use TerraStereo's Update Loaded command and you should see the points shortly in stereo view. If you have problems with the window setup, try one of the commands in the view setup toolbar.

## Tool Palette of TerraStereo for CAD

### General



#### General: Reload

Loads a previously converted TerraScan points into memory (e.g. Shortcut to a previously done Update Loaded).

#### General: Load

Loads a previously converted point cloud into memory or creates one from TerraScan project. Use this command project wide point clouds.

#### General: Update Loaded

Converts TerraScan loaded points into a stereo viewable model (this same model can later be accessed with Reload command). Use this command for viewing active TerraScan points in stereo.

#### General: Colour Table Export

Colour table export makes it possible to use right classification colouring based on the current design file colours. With this tool the colours shown in classification visualization mode will be shown correctly also on the stand alone TerraStereo.

#### General: Snap Settings

Snap Settings enables point cloud snapping on stereo view and on the other views. Here one can also set the snapping mode for normal or plane detection. In the latter case the plane detection works when dropping the cursor to the point cloud. After that the digitizing will be done on the detected plane. The detection can fail if there are too few points under the cursor area. Either adjust the radius of the cursor from the settings or interactively with left shift + left ctrl pressed down + mouse wheel rotation.

#### General: Cursor Settings

Cursor Settings allows customization of the Stereo view cross hair.

## View Setup



This toolbox has functions for automatically organizing stereo or mono view(s) and their related cross section views.

Mono mode by default sets view 7 to parallel mode and allows all stereo navigation features to be used in mono mode with a cross sections showing the primary orthogonal cross section (view5) and the natural digitizing plane cross section (view6). Note that in plane detection snapping mode of operation view 6 does not currently show the actual (detected) plane.

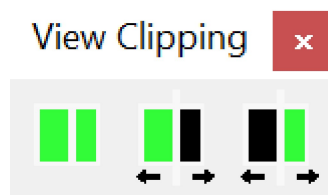
For stereo mode there are four configurations: Full screen with no tool area and two medium and one small screen setups having a small tool area on the right side of the screen 2. The tool area allows actively needed dialogs and cross section views to be placed there so that they will show correctly on both eyes.

If you want to have a full screen stereo with cross section views on the side monitor, you can first select mono system mode and then full screen.

The cross-sections used in stereo views are the primary orthogonal cross section (view5) and 90 degree rotated (around z axis) cross section (view6). The medium view option with a 'H' makes the view 6 cross section horizontal instead.

Cross section views can be adjusted or closed after the view setup. If they are located at the tool area on the stereo screen they should not exceed borders of the area.

## Clipping



### Floating Clipping Plane Concept

The View Clipping toolbar has commands for defining and resetting floating clip planes. The planes are not defined as fixed distance to the camera, but they are fixed to the world (unless you rotate or tilt the view). This allows zooming compared to the fixed distance clipping and is also faster than absolute clipping (e.g. volume clipping). It is not recommended to change the viewing angle after setting the floating clip plane.

### Clipping: Reset

This command will reset the front and back clippings. It is equivalent of setting the front and back clippings off from MicroStation view setup.

### Clipping: Define Front Clip

This command will set up a floating front clipping plane. The command has three phases:

1. Define the coarse clipping level or reset the current level
2. Finetune with a depth cursor
3. Accept the final depth or reset to re-define

Accepting will require two consecutive data points with the same depth.

Double resetting will exit the command with the clip removed from the use.

### Clipping: Define Rear Clip

This command will set up a floating rear or back clipping plane. It operates using similar logic to front clip setting.

## Cursor Selection



### Cursor: Standard

This command will set the stereo cursor operating in a standard way. The cursor is hovering around the point cloud and will snap to point depths or obey manual depth adjustment control. If you have AccuDraw on, only tentative points will change the depth of the cursor after the initial drawing point – otherwise the drawing will be done according to the accudraw.

### Cursor: Plane

This command will set the stereo cursor operating by setting it to the user defined plane. The plane is an ACS coordinate setup created from the point cloud by 'dropping' the cursor to the point cloud using left shift. The area of the plane detection can be adjusted by using right shift + right ctrl + mouse wheel.

After the plane is defined the cursor will be fixed to the plane regardless of the viewing angle. **When snapping to the vectors the resulting datapoint will also be in the defined plane, it will only XY-snap to the vector.**

After the first datapoint is entered and accudraw is enabled the compass will show the axis as related to the standard  $z=0$  plane. After the second datapoint is set then the compass will rotate according to the direction of the last vertex. If needed you can revert to the default plane compass by pressing left shift.

If Accudraw is disabled one can also use standard depth cursor to offset datapoints from the plane. The plane detection circle will be coloured red if the cursor has some offset from the plane.

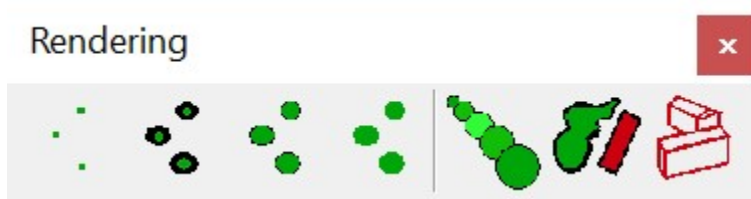
### Cursor: Cross Plane (beta)

Cross plane cursor will fix the plane to the plane that is orthogonal to the break line in the point cloud. Note that if there is no proper break line the plane cannot be detected. After the plane is fixed the operation is same as with the normal plane cursor.

### Cursor: Average Plane

Average plane cursor will start a command that needs several sub planes as an input. Use left shift to drop the selected points to the plane and then press datapoint to collect the points to the average plane. After collecting enough points click right button to fix the plane.

## Rendering



### Rendering: Contrast

There are four contrast options in the software:

Plain points: Points drawn as single pixels

High: Points are drawn with small bright disks and a dimmed exterior

Medium: Points are drawn with filled bright disks with just a dimmed border

None: Points are drawn with filled bright disks

### Rendering: Point Size

The contrast effect will be affected by the size of the disks drawn. Initial values work for some data sets but for optimal values one can interactively adjust the point size to match that which is required by the dataset. The interactive adjustment is performed like a MicroStation command – first a datapoint is entered in any view and then the adjustment will go bigger when moving the mouse right and smaller when moving it to the left. Second datapoint will end the adjustment and right click will cancel the command.

### Rendering: Visibility

This command pops up a dialog where one can choose between the available channels. If classification channel is available, the user can also enable/disable classification codes that are to be visible. You can also set if you want to view the points in front of or behind of the vectors. You can even set the point clouds display off but still use it on the background for navigation and snapping purposes while viewing just the vectors in stereo.

Optionally you can turn off the snapping. This is useful if you want to use TerraScan for controlling the point cloud snapping, for instance.

### Rendering: Update City Model (beta)

If you have TerraPhoto and TerraScan loaded and a Terrasolid city model in the design file this command updates the city model to the stereo view.



## Navigation in MicroStation Stereo Window

### Setup Views

You usually need to specify view parameters as wireframe and no grid. Also, you may want to adjust the visible levels.

You must set both view 7 and view 8 to use the same levels and parameters.

Then you define the perspective (that only needs to be done on view 7). Start by selecting normal camera. Then fit the view and use zoom area tool to get closer to the target area.

### TerraStereo Specific Navigation Commands

Initialize the stereo view first. Use top orientation and fit the view. If the file covers a large area it is recommended to zoom in to the right area first using zoom area tool.

When you are closer to points and vectors, you can start using mouse wheel **to move** in the dataset – the moving always goes to the cursor direction.

The cursor is set to the tentative point or active z depth. To set tentative point click left and right mouse button together. You can also press space bar to move the cursor to the point cloud.

To **pan using active depth** use a middle button (or wheel button) and either drag or click and move. Note that panning is always related to the depth the cursor was when panning started.

To **rotate around a cursor at active depth** hold down left control and then either move mouse sideways (to rotate around pure z axis) or move it vertically to change the viewing angle. When viewing the model from absolute top view the cross hair is highlighted and a letter 'T' pops up after the elevation value in the right side of the cross hair.

MicroStation rotate command can also be used from the view menu or its' shortcut (shift hold, and wheel button click). Note that you need to have a tentative point set before both operations.

To use default Microstation navigation commands and ignore TerraStereo overrides key in <tstereo navigation cad>. To revert back to default type <tstereo navigation default>. Perspective navigation with MicroStation default commands is a bit tricky but sometimes it works better than TerraStereo overrides; especially when there is no point cloud available and you are viewing just vectors.

### TerraStereo Specific Digitizing Functions

Use tentative point and snaps / locks like you would in normal MicroStation operation. Note that if the point cloud is active one can also snap into the points using tentative point snap. To adjust data point into the void location between points first snap into the points close by and then move the cursor to enter the data point using the previously snapped depth.

It is usually best to disable all additional helper utilities like Accudraw first.

When moving the cursor over the area one can press shift to immediately drop the cursor to the closest point. If ctrl-key is pressed while the mouse wheel is rotated it will adjust the depth of the cursor manually. To change the resolution of wheel in depth adjustment go to cursor settings.

All these functions work for view 7 only – on other views the only available special function is the point cloud display – no mouse function or navigation is overridden. Note that when navigating in these views the navigation logic is based on the vectors alone, because MicroStation itself is not ‘seeing’ the point cloud. With Terra Stereo snap settings, you can enable point cloud snapping on the other views than stereo, too.

## Cross Sections

Cross section views will always show the surroundings of the active depth point in the current cursor position.

If you want to **freeze the cross section**, use tentative point. The freezing is released after performing any other snapping (like holding down left shift). When the cross section is frozen, you can freely move the mouse to a cross section window and digitize directly from it.

To **change the zoom of the sections** either change it from zoom tools of the section window or then use right ctrl + mouse wheel to adjust.

To **change the thickness of the sections** use right shift + mouse wheel to adjust.

Note that with mouse wheel commands one the zoom and layer thickness can be adjusted in the middle of stereo digitizing.

## TerraStereo with Vectors only

It is possible to use TerraStereo for CAD without point clouds. This will work for most of the design file types, but for some types of elements (like grid mesh of certain type) automatic stereo offset will not work.

For grid mesh elements that do not work with automatic stereo there is a manual setting that one can use to view the dataset from top-down orientation. Set view 7 to top orientation and fit the view. Then move close to the objects in the view. Key in <stereo mode top> and enter datapoint on a view 7. Then slightly adjust the stereo offset by moving mouse left or right and stop adjusting by entering the second datapoint in the view. You should then be able to pan around with reasonable stereo effect and do a bit zoom in / out.

## Keyboard Command List

LS=Left SHIFT, RS = Right SHIFT

LC = Left CTRL, RC = Right CTRL

W = Mouse Wheel Rotation

M = Mouse Movement

For combinations, hold down the first indicated key first and then add the second one.

LS	Drop cursor to the points (Accudraw will override this)
LC + M	Rotate view
LC + W	Change the depth of the cursor (subject to Accudraw)
LC + LS	Pan stereo view to the cursor and synch any follower views
RS + W	Change cross section widths
RC + W	Change cross section zooms
RS + RC + W	Change plane cursor plane detection radius
LS	Change Accudraw compass orientation in plane cursor mode after second vertex