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Leica Cyclone – Creating a Mesh and Modeling Surface Topography: Setting Up the Model Space and Break Lines

This series will show you how create a mesh and model surface topography in Leica's Cyclone

Hint: You can click on any image to see a larger version.

In this guide a mesh is considered to be a series of triangles that represents a surface. Cyclone generates meshes by using the points in a registered unified model space or any combination of the three as vertices. For each adjacent trio of points in a cloud, an angle is created. The positive effect of creating a visually coherent surface from the point cloud, and it is the primary method for modeling topography.

TIPS

Break lines are lines or polylines that sub-divide the mesh; they represent the edges of a paved surface, a ridge, a channel, or any other topographic feature that the user wants to preserve. While mentioned in 2D topographic tracing, break lines become very important in meshing. Here, they have an accurate z-coordinate and they become the edges that the triangles in the mesh conform to, defining and controlling the smoothness and continuity of the mesh. They allow the user to break-up the mesh into reasonable "chunks" for future texturing and detailing.

Please see 'Leica Cyclone – Creating a Basic CAD Objects From Surface Topography (2D)' as a supplement to this workflow.

1. Open a Registered Unified Model Space -> Create fence around ground plane -> Right Click -> Copy Fenced to new Model Space (NOTE: viewing from a standard side, front, or back view in orthographic mode assists in selection) -> Original MS may be closed

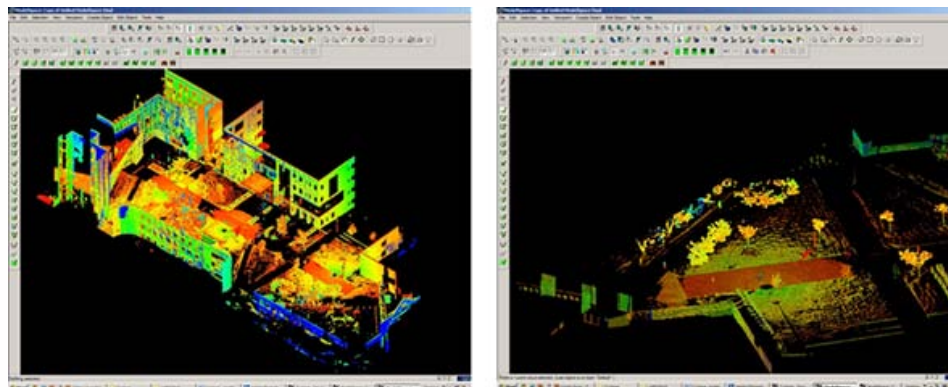


Figure 1 – (Left) Original registered scan world of plaza (Right) Point Cloud Sub-Selection (Select -> Right Click -> Point Cloud Sub-Selection) allows unneeded points, such as trees and vertical surfaces, to be deleted; Sub-selection allows the user to precisely choose and view points before deciding to delete

2. In the new Working MS -> **Select and delete unneeded points** (it's best to eliminate as much vertical surface data as possible so that the ground plane to be modeled is isolated; objects in motion, such as trees/vegetation can be especially problematic and cleaning up areas where these are abundant is suggested; eliminating data that may be present inside buildings or areas that will not be modeled is also suggested)

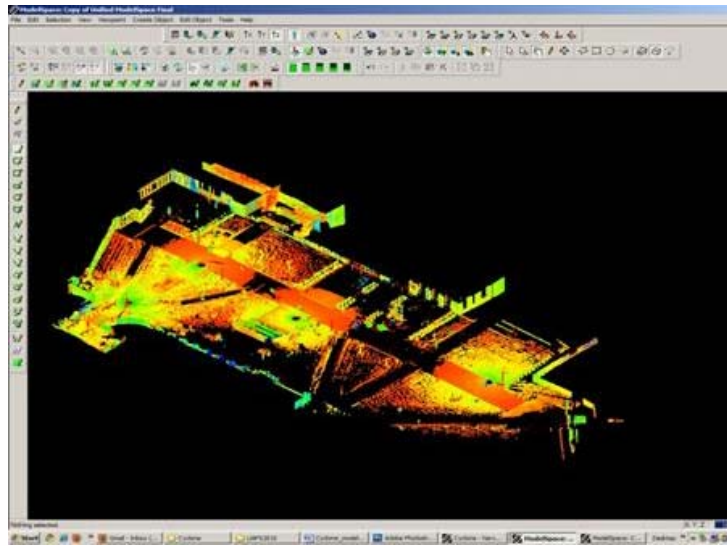


Figure 2 – The same plaza as Figure 1 now copied to a working MS and “cleaned” of unneeded vertical surfaces and vegetation leaving only the ground plane to be modeled.

3. Create new layers for the breaklines and features (Shift + L) -> Review the area to be modeled identifying where the surface changes and/or where the user wants a clean break or difference between adjacent surfaces. Create layers for primary and secondary features as needed.

4. Create lines to represent the topography and features, assigning an accurate x, y, and z coordinate -> There are several ways to make lines including (1) using 2D drawing methods (covered in ‘Topography and Site Elements – 2D’ above) (2) with pick points, (3) by extending an existing line (4) by snapping two existing lines together (5) by creating a polyline with Fit Edge command, and (6) by merging polylines together.

See Help -> Contents -> Search -> ‘Make Lines, Polylines, and Breaklines’ for steps for each of these methods. There are additional variations of each. **BEWARE:** Lines created by pick points cannot be used for break lines in meshing; if picking points, be sure to create a polyline rather than a line segment.

5. Tips

A. If drawn in 2D, use Edit Object -> Move/Rotate to move the object to the correct z-coordinate; there are multiple options moving objects including by a standard axis and pick points.

B. Create additional break lines following the feature or edge of the break lines; place these to break up the mesh and around the boundaries, segmenting out areas where a topographic ground plane is not needed (ie: inside buildings)

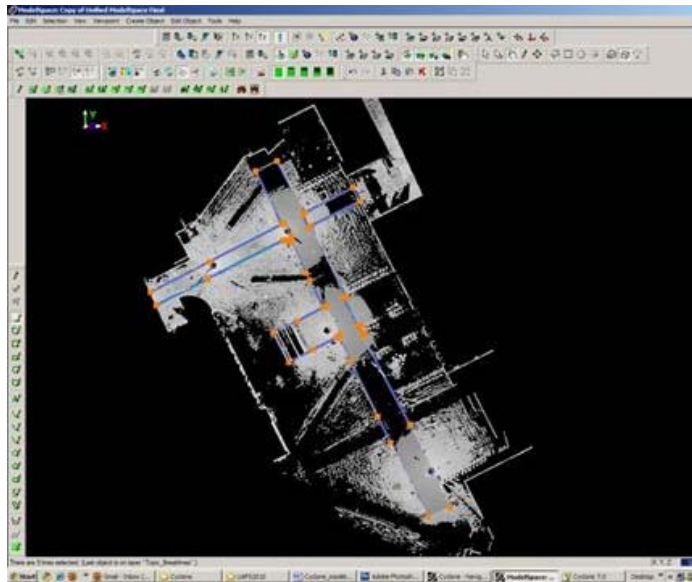


Figure 3 – Top view of plaza; Polylines have been created to outline where the sidewalk and grass meet; orange handles help highlight the polylines

More Tips:

- C. Use multiple views to confirm line is properly located at all angles and handle constraints (Edit Object -> Handles constrain to -> Various options – NOTE: once placed in top view, constraining handles to z-direction helps placement in 3D)
- D. Try different methods to see what works for you. With all, use multiple views to confirm the line is properly located at all angles

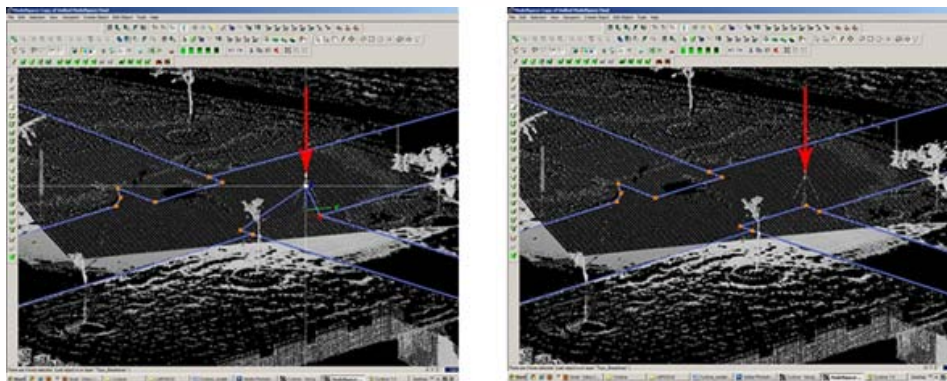
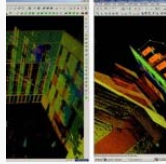


Figure 4 – (Left) Although from Top View, the breakline looks correct, inspection from a different angle reveals that it is not correct (Right) Handles and constraints (Edit Object -> Handles -> Constrain Motion) are used to pull the polyline into the correct position – every section of every breakline should be inspected from multiple views

- 6. **Create handles at places where polylines intersect** (Select line -> ALT + Select point on line for new handle to help snap lines together).
- 7. **Delete all points beyond boundary of mesh** -> Select polyline representing boundary of mesh -> Right click -> Fence -> From Selection -> Fence -> Delete outside
- 8. **Delete points within other breaklines** to remove any remaining points that should not be considered in the creation of the mesh -> Copy final breaklines to original or temporary working space in case altered/needed in future
- 8. **Unify points reducing spacing to 1 foot** to start and adjust settings for desired results.



You are reading the series: [Leica Cyclone - Creating a Mesh and Modeling Surface Topography \(2.5D\)](#)

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[Leica Cyclone – Creating a Mesh and Modeling Surface Topography: Creating the Topographic Mesh](#)

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