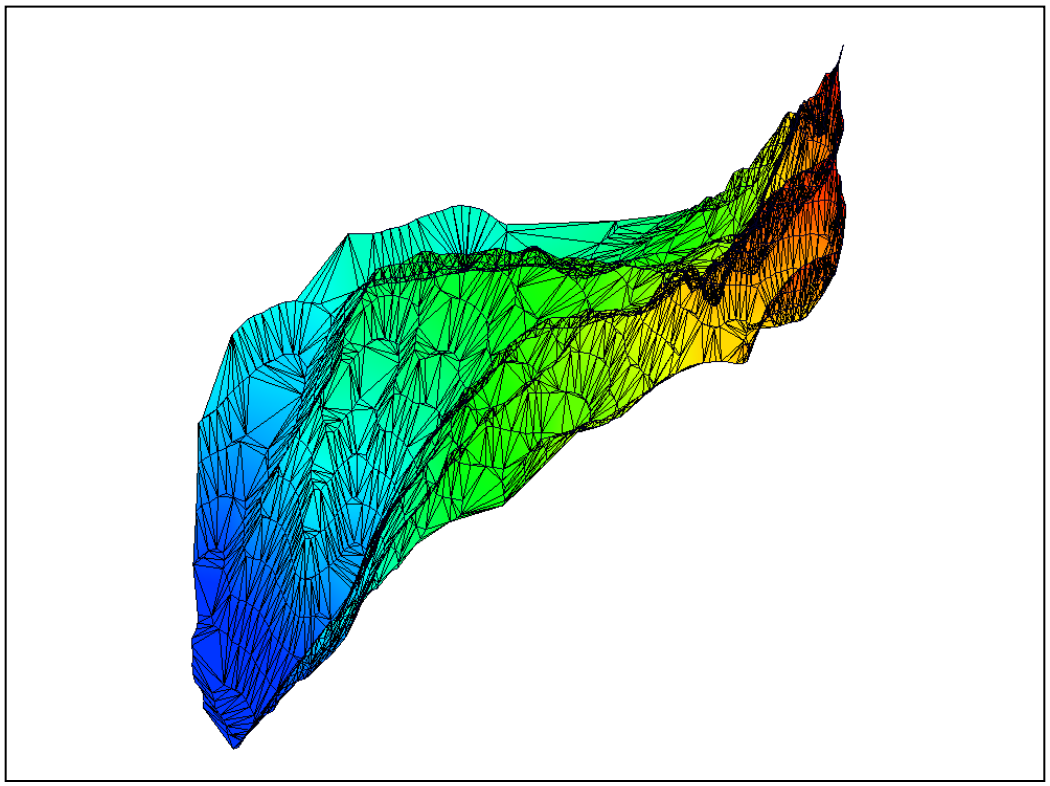
WMS

v. 11.0

WMS 11.0 Tutorial

Using CAD Data

Import, view, edit, convert, digitize, and export CAD data



Objectives

Learn to import CAD files, convert them to feature objects and TINS, and export TIN contours to a CAD file format.

Prerequisite Tutorials

- None

Required Components

- Data
- GIS
- Map

Time

- 15–25 minutes

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1 Introduction

Files created using computer-aided design (CAD) can be an excellent way to import elevation contours as well as detailed designs and layouts for a specific area.

This tutorial will demonstrate and discuss importing CAD data, converting CAD data to TINs and feature objects, and exporting project data to a CAD file.

2 Getting Started

Starting WMS new at the beginning of each tutorial is recommended. This resets the data, display options, and other WMS settings to their defaults. To do this:

1. If necessary, launch WMS.
2. If WMS is already running, press *Ctrl-N* or select *File* | **New…** to ensure that the program settings are restored to their default state.
3. A dialog may appear asking to save changes. Click **Don't Save** to clear all data.

The graphics window of WMS should refresh to show an empty space.

3 Importing a CAD File

CAD data can be found in multiple formats. WMS can import DWG, DXF, and DGN file formats. To import a CAD file, do the following:

1. Select *File* | **Open…** to bring up the *Open* dialog.
2. Select "All Files (*.*)" from the *Files of type* drop-down.
3. Select "tmcontours.dwg" and click **OK** to exit the *Open* dialog.

This file was created in a CAD program and contains elevation contours for a small area (Figure 1).

Figure 1 Imported CAD contour file

4 Converting CAD Data to Feature Objects

Terrain data is often stored or processed in a CAD program in the form of contours or triangles. In either case, the 3D data points (*x*,*y*,*z*) can be converted from the CAD data in WMS.

The elevation contour data in this file should first be converted to arcs.

1. Right-click on "tmcontours.dwg" under the "CAD Data" folder and select *Convert* | **Feature Objects…** to bring up the *CAD → Feature Objects* dialog.
2. Uncheck the check boxes on rows 1 and 2, leaving *CAD layers_arcs* turned on.
3. Click **OK** to close the *CAD → Feature Objects* dialog and bring up the *Clean Options* dialog.
4. Click **OK** to close the *Clean Options* dialog and open the *Properties* dialog.
5. Select "General" from the *Coverage type* drop-down.
6. Enter "Feature CAD" as the *Coverage name*.
7. Click **OK** to close the *Coverage Properties* dialog.

A new "Feature CAD" coverage should appear in the Project Explorer. The arc vertices should now be redistributed, and the arcs can be converted to a TIN.

4.1 Redistributing the Vertices

In order to maintain consistency across all of the arcs, it is recommended to redistribute the vertices after converting from a CAD file.

1. Switch to the **Map** module and select the **Select Feature Arc** tool.
2. Select *Edit* | **Select All** to select all feature arcs.

3. Select *Feature Objects* | **Redistribute…** to bring up the *Redistribute Vertices* dialog.
4. In the *Arc Redistribution* section, select "Specified spacing" from the *Specify* drop-down.
5. Enter "20.00" as the *Average Spacing*.
6. Click **OK** to close the *Redistribute Vertices* dialog.
7. Click anywhere outside of the arcs to deselect all of them.

4.2 Converting the Coverage to a TIN

Now that the "Feature CAD" coverage has been created, convert it to a TIN.

1. Select *Feature Objects* | **Build Polygon**.
2. If asked to use all arcs, click **OK**.
3. Right-click on "Feature CAD" and select **Create TIN…** to bring up the *Create TIN Options* dialog.
4. Click **OK** to close the *Create TIN Options* dialog.

A "New tin" should appear in the Project Explorer.

5. Right-click on "New tin" and select **Rename**.
6. Enter "Feature CAD TIN" and press *Enter* to set the new name.

The project should appear similar to Figure 2.

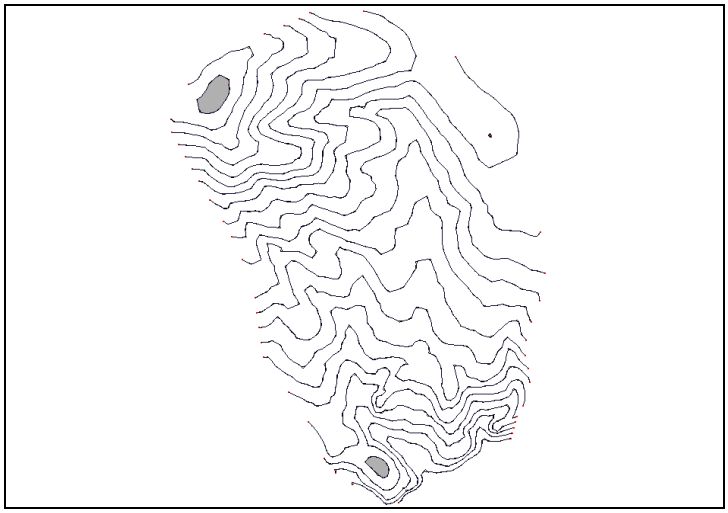

Figure 2 Coverage converted to a TIN

5 Converting Arcs to TIN Vertices

When redistributing the vertices, WMS interpolates elevations for any new vertices on the arc from existing arc vertices. Now that the vertices on the arcs have been redistributed to a more even spacing, convert the contours to a TIN.

1. Switch to the **Map** module.
2. Select *Feature Objects* | **Arcs** → **TIN Vertices** to create a "New tin" in the Project Explorer.
3. Right-click on "New tin" and select *Triangles* | **Triangulate**.

WMS will create triangles throughout the TIN (Figure 3).

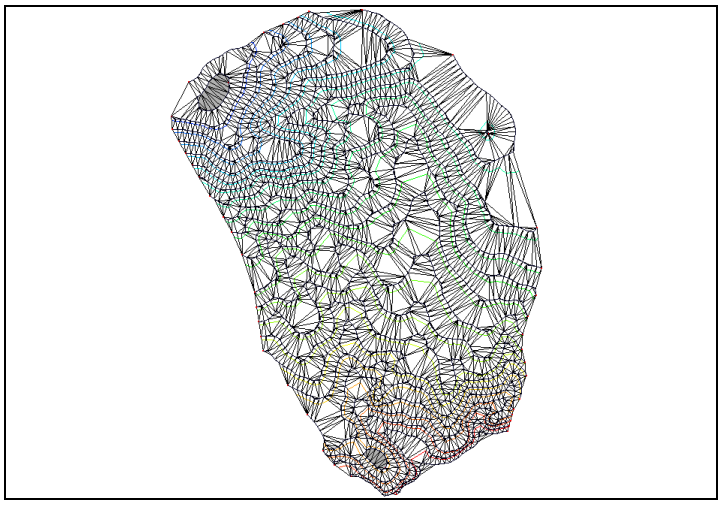

Figure 3 Triangulated TIN

4. Switch to the **Map Module**.
5. Select *Feature Objects* | **Delete** to bring up a confirmation dialog.
6. Click **OK** to delete all of the original contour data.
7. Right-click on "New tin" and select **Rename**.
8. Enter "Feature CAD Triangles" and press *Enter* to set the new name.

Before being used, the projections should be set or verified for any imported CAD data and any TINS or feature objects created from the CAD data if it was not set prior to conversion. For more information on setting projections, please see the "Projections / Coordinate Systems" tutorial.

6 Converting Directly to a TIN

CAD data can be converted to TINs in two ways: to TIN triangles and to TIN points. Converting to either follows a similar process. To convert to TIN triangles, CAD faces are required in the CAD file. Converting to TIN points requires CAD points in the CAD file.

The method for converting to TIN points is demonstrated below.

6.1 Converting Directly to TIN Points

Converting to TIN points first allows for the opportunity to adjust the points prior to triangulating the TIN. This is useful because the vertices along each contour line might be at a random or undesirable spacing to generate a quality TIN.

1. Right-click on "tmcontours.dwg" under the "CAD Data" folder in the Project Explorer and select *Convert* | **CAD Points to TIN Points…** to bring up the *CAD → TIN* dialog.
2. Turn off all layers but "CAD layers_outletpts" and "CAD layers_arcs".
3. Enter "CAD TIN POINTS" as the *TIN name* and click **OK** to close the *CAD → TIN* dialog.

A new "CAD TIN POINTS" will appear in the Project Explorer. The points defining the contour lines contain *x*, *y*, and *z* coordinates. Now triangulate them.

4. Right-click on "CAD TIN POINTS" and select *Triangles* | **Triangulate**.

When the points are converted to TIN points and retriangulated, a 3D TIN surface is created (Figure 4). Feel free to turn on and off "Feature CAD Triangles" and "Feature CAD TIN" to see the differences between them. Zoom in, rotate, and change the display or contour options as desired in order to better visualize the TIN.

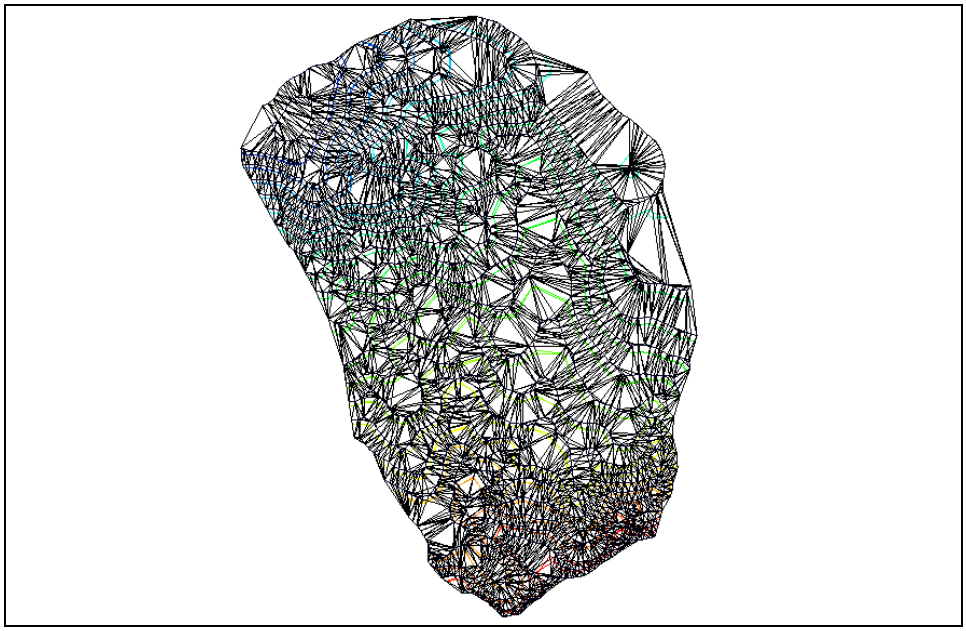

Figure 4 The 3D TIN surface resulting from conversion from TIN points

7 Exporting Data to CAD

Visible data can be converted and saved as CAD data for use in CAD programs.

1. In the Project Explorer, right-click on "GIS Data" and select **Data → CAD**.

A "WMS Data" folder containing a set of layers should now be visible under the "CAD Data" folder in the Project Explorer. In order to view only the newly created CAD data, hide all other data in the Project Explorer.

2. Turn off the "Map Data" and "Terrain Data" folders in the Project Explorer.
3. Turn off the "0" and "CAD TIN POINTS_con" layers under the "WMS Data" folder.
4. Select *File* | **Save As…** to bring up the *Save As* dialog.
5. Select "DWG Files (*.dwg)" from the *Save as type* drop-down.
6. Enter "UsingTINs.dwg" as the *File name*.
7. Click **Save** to export the DWG file and close the *Save As* dialog.

8 Conclusion

This concludes the "Using CAD Data" tutorial. The following topics were discussed and demonstrated:

- How to import CAD data
- How to convert CAD data
- How to export data to CAD