

DC Processing Extension Manual

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General

1. Introduction

The *DC Processing Extension* provides several functions to process and convert data in *ArcView 3.**.

The *DC Processing Extension* is available from <http://dcwaterdesign.sourceforge.net>. It is free software released under the terms of the GNU Lesser General License (LGPL) - the full source code is available (Open Source).

This manual describes version 1.2.9 of the *DC Processing Extension*.

1.1. What's New?

A summary of changes in the different versions of the DC Processing Extension.

1.1.1. Version 1.2.9

- Critical bugfix for the "Create Points from Grid" function (Thanks to Thomas).

1.1.2. Version 1.2.8

- New function "Flip End Lines". See Section 1.1.23, "Flip End Lines" [7].
- New function "Extend Lines" See Section 1.1.24, "Extend Lines" [7].
- Bug fixes and improvements for the "Classify Node Connections" function.
- Improved and extended documentation.

1.1.3. Version 1.2.7

- New function "Create Portable Project" using a script by Juergen Evert (<JurgenEvert@aol.com>). See Section 1.3.1, "Create Portable Project" [8].
- Bug fixes for connection classification.
- Updated documentation
- Sample dataset to test connection detail classification in the `sample` folder of the source tarball. (Thanks to Ratiba Makansi)

1.1.4. Version 1.2.6

- Robustness improvements for connection classification and angle calculation.
- Bug fix for the connection classification (script wasn't compiled).

1.1.5. Version 1.2.5

- Bug fix for angle calculation. Angle calculation allows to enter an offset.
- Water network connection classification function for BoQ generation.
- More robust Segmentize Polylines function.
- New function Calculate Network Tree Names
- New function Split Polylines by Polylines.

2. Requirements

ArcView version 3.0, 3.1, 3.2 or 3.3 is required in order to use the *DC Processing Extension*.

Some functions require the *Spatial Analyst* or *3D Analyst* extensions.

3. Installation

How to install the *DC Processing Extension* using either the installer or manually.

3.1. Installation Using the Installer

How to install the *DC Processing Extension* using the installer.

Download the installer and execute it.

Select your ArcView installation folder.

3.2. Manual Installation

Save the extension file (dcprocessing.avx) in the ArcView extensions directory (Usually this is c:\esri\av_gis30\arcview\ext32).

4. Loading the Extension

The extension has to be loaded to your ArcView project before you can use it.

Load the Extension into ArcView (File -> Extensions...)

In the View GUI, there will be a new menu called "DC Processing" (If necessary, open a view to see it).

In addition, there will be a new menu called "DC Processing" in the Project and Table GUIs.

For more information on Extensions, see your ArcView Documentation.

Reference

1. Functions

The functions provided by the *DC Processing Extension*.

1.1. View GUI

Functions added to the View GUI by the extension.

1.1.1. Split Polylines by Polylines

Split Polylines by Polylines allows to split a polylines theme by another polyline theme.

Activate two polyline themes. Start editing of the theme you want to split and select Split Polylines by Polylines from the DC Processing menu.

All attributes will be copied ignoring split rules so that you'll have to update shape related attributes manually.

1.1.2. Split Polylines by Points

Split Polylines By Points allows to split a polyline theme by a point theme.

Make sure that the points are properly snapped.

Remember to set the split rules or update your shape related attributes after splitting.

1.1.3. Split Polygons by Lines

Split a polygon theme by a line theme.

The splitting lines should overlap the Polygons.

1.1.4. Points from Polylines

Extract vertices from lines.

Points from Polylines takes a polyline theme and creates a new point theme from its vertices.

All the attributes of the line are copied to the respecting points.

Useful to generate a DTM from contour lines, as the *Spatial Analyst* and *3D Analyst* only take point data as DTM input.

1.1.5. Polyline from Points and Table

Polylines from Points and Table allows the user to create 2-vertex-lines (like in a sewer network) from a point theme with unique IDs and a table (e.g. a DBF file) which contains all the line information: start node ID and end node ID.

The table should contain the following fields:

- From_ID
- To_ID
- Diameter

The point theme should contain the following fields:

- Nodeid
- Node_Z

1.1.6. Polylines from PolylineZ

With Polylines from PolylineZ you can convert a 3D shapefile to a 2D shapefile. The dropped z-value will be added to a new attribute field. This way, it doesn't get lost. 3D shapes are not editable with the current ArcView versions.

1.1.7. Create Center Points

Choose "Create Center Points from Polygons" in the DC Processing menu.

Choose the polygon theme you want to extract the center points from.

Enter the name of the new point theme.

All the attributes of the polygon theme will be copied to respective center points.

1.1.8. Create Polylines from Polygons

Create Polylines from Polygons creates a new polyline theme containing the boundaries of the given polygon theme. The user is asked for a polygon theme and the name of the new polyline theme.

1.1.9. Assign Attributes from Grid to Points

Assign Attributes from Grid to Points reads the grid values for every point in a point theme and stores it in a numerical field of the point table.



Important

This function requires the Spatial Analyst Extension.

1.1.10. Create Points from Multipoints

Create Points from Multipoints creates a new point theme, where the points are located at the center of the respecting multipoint. All the attributes are copied.

The user is asked to select a multipoint theme from the current view and the output shapefile name.

1.1.11. Create Square Polygons from Points

Create a polygon theme containing square polygons from a point theme containing the centers of the polygons.

The user is prompted to enter the square length. All the attributes are copied.

1.1.12. Create Points from Grid

Create a point theme from a grid. The points are located in the grid center.

1.1.13. Create Cross Polylines from Points

Create a polyline theme containing cross-shaped polylines from a point theme containing the centers of the crosses.

The user is prompted to enter the cross length.

All the attributes are copied.

1.1.14. Create Polygons from Polylines

Converts polygons to polylines.

Make sure that the polylines are closed.

1.1.15. Create Arrows from Lines

Converts the lines in an existing polyline theme to arrows. The arrow will stretch from the first point to the last point of the line.

1.1.16. Create Polygons from TIN

Create a polygon theme from a TIN (Triangular Irregular Network).



Important

This function requires the *3D Analyst*.

1.1.17. Interpolate Point Values from Other Points

Interpolates point values from other points.

1.1.18. Interpolate Point Values from Points and TIN

Interpolate values in a point values from a point theme and a TIN.

1.1.19. Interpolate Node Values in Network

Linear interpolation of point values in a network (line-node topology).

- Select polyline and point that form the network from the list of themes in the view.
- Select the field to interpolate from the table of the point theme.
- The interpolation takes place for all nodes where the value is 0 or NULL and upstream and downstream traces find values for interpolation.

The traces end where the network branches.

1.1.20. Segmentize Polylines

Create a new polyline theme by segmentizing an existing polyline theme.

The maximum and minimum segment length has to be specified.

All attributes are copied to the new theme's respective segments.

Lines that are too long will be split up into separate segments, but lines shorter than the minimum segment length will not be concatenated. The concatenation can be performed with the skeletonization function of the *DC Water Design Extension*.

The minimum segment is used to avoid those short lines that would be created if a line is just a little bit longer

than the maximum segment length. If the last segment created by segmentation with the maximum segment length is shorter than the minimum segment length, the last two segments are merged again and split into one segment with the minimum segment length and the remainder.

1.1.21. Calculate Node Angles

Calculate angles for those nodes in the network that have one or two lines connected to it.

Node and line theme of the network have to be selected from the list of themes in the view.

A field from the node theme has to be selected to store the calculated node angle.

The angle can be used to rotate symbols (e.g. valves).

In case the two lines connected to a node don't form a straight line, the average of both angles is calculated as a compromise.

1.1.22. Classify Node Connections

Classifies the connection types of different water supply network nodes in order to allow the automatic creation of a BoQ (Bill of Quantities).

The following set of themes is required to use this function:

- Line theme (polyline)
- Junction theme (point) with the following fields that will be overwritten:
 - Connection (integer)
 - DN1 (integer)
 - DN2 (integer)
 - DN3 (integer)
- Valve theme (point)

The three themes have to be properly snapped (line-node topology).

To use this function, add your network's line, node and valve themes to the view.

Start editing the node theme.

Activate the three themes.

Select Classify Node Connections from the DC Processing menu.

You will be asked to provide select a number field from the node theme to store the classification. Please select the "Connection" field.

To create a BoQ, you'll have to load the classified shapefile to a relational database and execute the SQL scripts `create_dcboq_ddl.sql` and `fitting_boq.sql`. The scripts can be found in the `scripts` folder of the DC Processing Extension source distribution.

The view "PositionView" will contain the BoQ.

A junction with two pipes connected that have the same diameter is not considered a special connection.



Caution

The function considers every valve that is linked by one pipe to a junction by only one pipe to be part of the connection at the junction. The length of the pipe is not considered. To prevent valves from being accounted two times, you may have to introduce additional junctions to correctly assign the valve to a connection.

Valves that are surrounded by junctions that are no special connections are not accounted for.

The function assumes that your network only consists of "valid" connections. If your network contains invalid connection types this will most probably lead to classification errors.



Note

The function uses a snapping radius of 0.01.

1.1.23. Flip End Lines

Flip all lines connected to end nodes (end lines) in a consistent direction. This is useful e.g. to determine the correct node angle for end caps in water supply networks.

All end lines will end at the end node.



Note

Isolated lines (those lines having two end nodes) will be flipped randomly.



Note

This function uses a snapping radius of 0.01 map units.

1.1.24. Extend Lines

Extend selected lines by scaling around the end point. The scale factor is determined in such a way that the length increased by a certain length. This length is specified in map units.

To use the function, start editing a line theme and select Extend Lines from the menu.

You will be asked to specify the length in map units by which the line shall be extended.

This function is most useful for straight lines with two vertices.



Tip

Also allows negative scaling (shorten lines). When shortening lines make sure that the line length is greater than the length by which the line should be shortened.

1.2. Table GUI

Functions added to the table GUI by the extension.

1.2.1. Tag Duplicate Records

Selects duplicate records in a field.

1.2.2. Create Unique ID

Create Unique ID creates a unique ID for a selected field of a selected theme in the active view.

The field type may be number or string.

Like the ArcView field calculator, Create Unique ID will only work on selected rows of a table which is editable. If there's no selection, the function will work on all records of the table.

1.2.3. Calculate Network Tree Names

Calculate Network Tree Names creates a unique ID for lines in a network. The IDs are based on the position of the lines in the network tree.

Sequential lines will be numbered in sequential order (1,2,3...). Branch lines will be indicated by "." and a new numbering starting from one: 4.1, 4.2, 4.2.1...

In case of loops, it is unpredictable at which point the loop will be closed. The IDs may look strange in these areas.

To use the function, have a string field of appropriate length ready.

Use the calculator to assign the value "" to all records.

Select your starting line and assign the value "1".

Make sure that the table is still editable and your field is selected.

From the DC Processing menu, select Calculate Network Tree Names.

1.3. Project GUI

Functions added to the project GUI by the extension.

1.3.1. Create Portable Project

Read a projectfile and copy all theme files (Shapefiles, images, images of catalogs, tables, etc.) to a separate folder.

Creates a new project file with relative paths.

If you save the new project in Arcview it gets absolute paths and will not be portable any more.

You can use the project on any Computer, copy the new projectfile to a laptop or burn it on CD.

Remove Extensions before, the extension file will be copied too, but may not work correctly.



Tip

Reset the extensions to the system defaults.



Caution

Check for image catalogs, they may have a size of several Gigabytes.

Check the layouts which aren't connected to views.



Note

Please provide feedback regarding this function to Juergen Evert <JurgenEvert@aol.com>.

1.3.2. Recursive Copy of Projection Files

Projection files are a feature introduced by ArcView 3.2 and ArcInfo 8. They are important when it comes to loading data into Geodatabases. The menu item "Copy Projection Files" lets the user select one projection file which will be copied to all the shapefiles in a folder and its subfolder which don't have a projection file.

1.3.3. Batch-convert Coverages To Shapefiles

This Function allows to convert all coverages in a directory to shapefiles.

The user is prompted for the folder containing the coverages, the coverage features to be exported and the destination folder.



Important

This function requires the DC Directory Browsing extension.

2. Sample Data

Sample data to test the connection detail classification is available in the `sample` folder of the source tarball.

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