

The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

March 2013

FEATURED COMMAND

Convert Line Segments to a Curve



Application Description

Mappers have long been dealing with coarsely digitized information that although it roughly represents the geometry it is not accurate enough for mapping applications. Not to mention that some of this geometry can be tough on the eyes to look at.

As such, often folks will spend time to trace over or try to smooth out the courses that represent curves so that they at least give the appearance of being a curve.

The question becomes how can one create curves for polygon or polylines features when the geometry for these features contains line segments that roughly approximates a curve.

The CEDRA Solution

To address the application described above, the [Line Segments to Curve] command within the {CEDRA-Polygon-Tools} toolbar, shown in Figure 1, was created.

Line Segments to Curves Overview

The *Line Segments to Curve* menu command enables the user to parse the line segments comprising a polygon or polyline feature and convert those line segments which represent a circular curve into a single curve definition. The result of which will be a smoother looking geometry. There is no limit to the number of curves that a polygon or polyline feature may have. For those

features which have been coarsely digitized, this command is an excellent tool for smoothing out those sides which represent circular curves.

Additionally, this tool offers the user the ability to edit or manipulate the geometric data of the courses comprising a polyline or polygon feature. In so doing the user is able to explicitly set the geometric parameters for the courses comprising a feature.

This command operates on the selected layer in the Table of Contents. If the layer contains selected features then only the selected features are processed. If there are no selected features then all of the features in the layer are processed.

Command Of The Month bulletin

This month's issue discusses how to convert lines segments in a polygon or polyline feature into a curve for a smoother looking geometry.

The user, via a multi-input dialog box, is able to specify various curve conversion parameters. These parameters enable the user to control the conversion process. By specifying different values for these parameters the user can achieve different results. This process repeats until the desired result is attained or the command aborted.

As mentioned above, the user has the ability to individually edit the courses comprising the geometry. This is achieved with the Parcel and Traverse

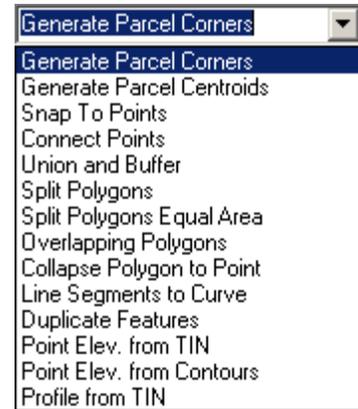


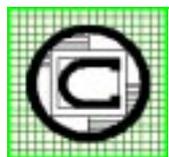
Figure 1
CEDRA-Polygon-Tools Toolbar

Course Entry Form dialog box. This dialog box provides the user a great deal of flexibility in editing the individual courses. Operating in a spreadsheet like manner, each of the courses appears on a row. The user is then able to explicitly enter the appropriate geometric information for each of the courses. The user also has the ability to add, insert and delete courses, if desired.

Line Segments to Curves Operation

To use this tool command, the user should:

- **1** Scroll down in the **table of contents area**, and **select the layer** that contains the polygon or polyline feature(s) to be processed.
- **2** If all features within the active layer are to be processed, proceed to the next step, other-



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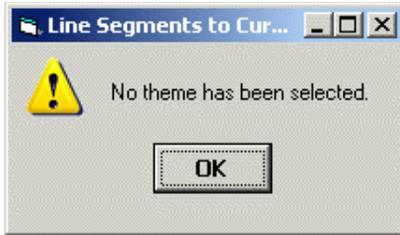


Figure 2
No Layer Selected
Warning Message

wise, **select** with the  *Select Features from Active Layers* tool the **features** to be processed.

- 3 **Scroll** down in the {CEDRA-Polygon-Tools} menu combo box, and **select** the [Line Segments to Curve] menu command (see Figure 1). If the prerequisite conditions are not met, a warning message such as that shown in Figure 2 or 3 will be displayed. At this point click the OK button and make the appropriate adjustments.
- 4 If the layer contains selected features, proceed to the next step, otherwise, **click** at the **Yes** or **No** button, see Figure 4, to indicate whether or not all features in the active layer are to be processed. If the No button is selected, the command is aborted.
- 5 At this point the command will begin to process the feature(s), one at a time. Shown in Figure 5 is a sample polygon to be processed. In this figure the individual vertices comprising the boundary of the polygon are displayed. The vertex shown in red denotes the end point of the polygon boundary. When the command processes a feature, the feature is highlighted on the screen. The vertices comprising the feature may or may not be shown. They are shown in this figure



Figure 3
More than 1 Layer Selected
Warning Message

to indicate the result of executing this command. At this point, a multi-input dialog box, see Figure 6, appears following the highlighting of the feature.

Enter in the *Minimum Number of Segments in a Curve*: data field the **minimum number of chords** that a curve may have. This value denotes the minimum number of line segments that need to be present in order to represent a curve.

- 6 **Enter** in the *Maximum Chord Deflection in Degrees*: data field the **maximum deflection angle**, in degrees and decimal thereof, between successive chords. This value denotes the maximum deflection angle between consecutive segments that may be considered

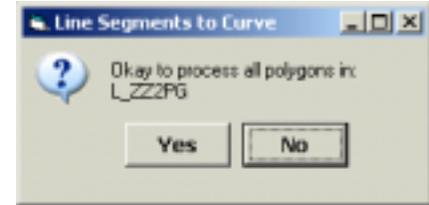


Figure 4
Okay to Process All Features
Query Message Box

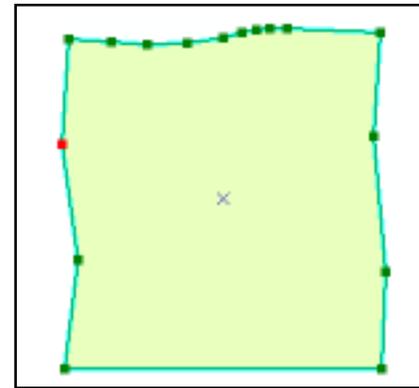


Figure 5
Original Shape of
feature to be Processed

acceptable as segments forming a curve.

- 7 **Enter** in the *Curve Segment Length Tolerance (%)*: data field the **maximum difference in length**, expressed in percent (%) form of this difference over

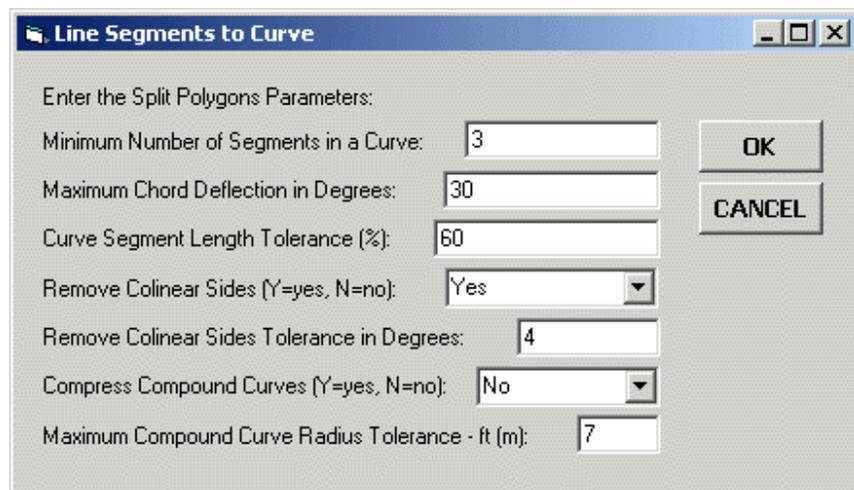


Figure 6
Multi-Input Dialog Box containing Line Segments to Curve Parameters

- the length of successive segments. Since the line segments which form a curve may not be of equal length, this value denotes the tolerance between consecutive segments in which the lengths may be considered acceptable as segments forming a curve.
- 8 **Scroll** down in the *Remove Colinear Sides* (*Y=yes, N=no*): data field, and select the:
- **y** option to indicate that consecutive line segments whose direction are within the colinear sides tolerance value should be considered as a single segment, or the
 - **n** option to indicate that the colinear side check is not to be performed.
- 9 **Enter** in the *Remove Colinear Sides Tolerance in Degrees*: data field the **maximum deflection angle**, in degrees and decimal thereof, between successive chords.
- 10 **Scroll** down in the *Compress Compound Curves* (*Y=yes, N=no*): data field, and select the:
- **y** option to indicate that compound curves are to be compressed into a single curve definition, or the
 - **n** option to indicate that the compound curve check is not to be performed.
- 11 **Enter** in the *Maximum Compound Curve Radius Tolerance*: data field the **maximum difference**, in feet (meters) between two consecutive curve radii which can be considered as a compound curve.
- 12 **Click** at the **OK** button to begin the processing, or **click** at the **Cancel** button to abort the command.
- 13 Once the command has finished its processing, the results of the altered courses are displayed in red and blue markers are displayed at the start and end points of the courses, see Figure 7. By comparing the vertices shown in Figure 5 with the blue markers shown in Figure 7, it can be seen how the command has altered the courses at the top of the figure by introducing curve definitions. At this point, if more than one feature is to be processed the dialog box shown in Figure 8 will be presented. If only one feature is to be processed the dialog box shown in Figure 9 will be displayed. In either case, **click the square** to the left of the:
- *Update feature shape when Yes button clicked* to indicate that the shape of the feature is as desired and is to be changed once the Yes button is selected,
 - *Create Lines/Curves when Yes button clicked* to indicate that the shape of the feature is as desired and that new line and curve features are to be created representing the altered

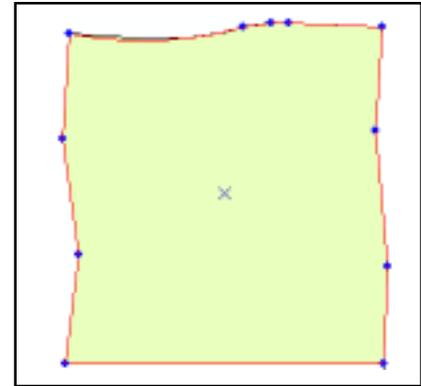


Figure 7
Altered Shape of
feature to be Processed

shape once the Yes button is selected,

- *Edit Courses when Yes button clicked* to indicate that the Parcel and Traverse Course Entry Form dialog box is to be displayed, which enables the user to edit the individual courses comprising the shape, once the Yes button is selected, or, if more than one feature is to be processed,
 - *Process all features using these settings* to indicate that all of the remaining features are to be edited using the settings as currently defined.
- 14 **Click** at the **Yes** button to perform the selected action, or **click** at the **No** button to indicate that the shape is not as desired and that the command

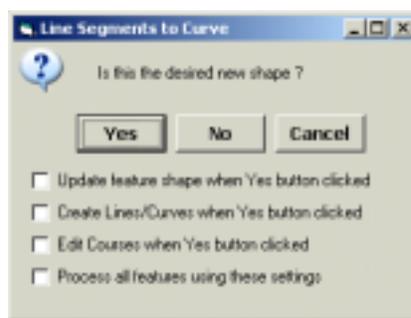


Figure 8
Confirmation of Shape
Query Message Box

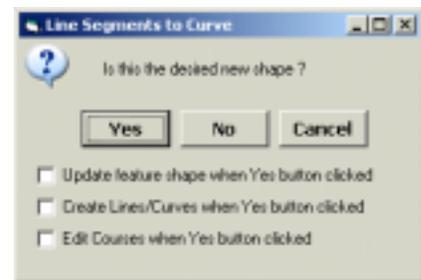


Figure 9
Confirmation of Shape
Query Message Box

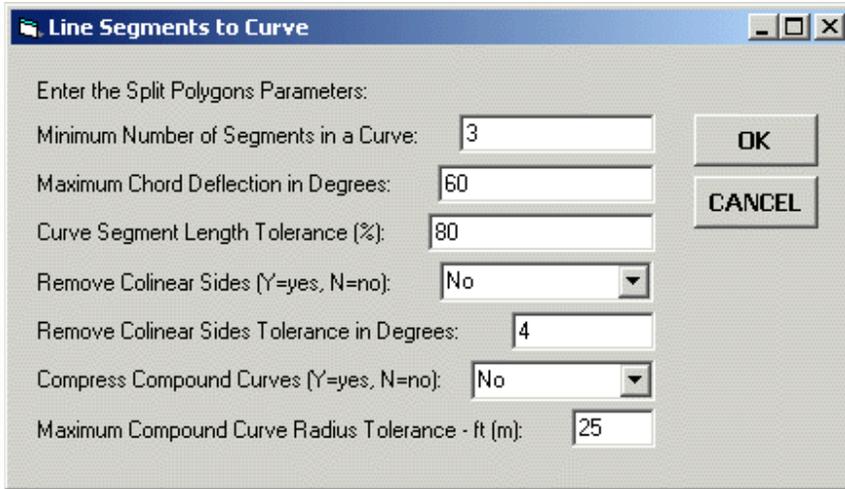


Figure 10
Multi-Input Dialog Box containing Line Segments to Curve Parameters

is to be repeated commencing from Step 5 at which point new values can be entered, see Figure 10, or **click** at the **Cancel** button to abort the command.

Shown in Figure 10 are different values than what appeared in Figure 6. As a result, the shape that is generated is also different, see Figure 11. In Figure 11, the top edge of the polygon is comprised of 3 courses, 2 curves and 1 line segment while in Figure 7 the top edge is comprised of 4 courses, 2 curves and 2 line segments.

Depending upon the desired result, the user can try various parameter settings without actually modifying the geometry of the feature being processed. Should the user wish to explicitly edit the individual courses associated with the feature, the *Edit Courses when Yes button clicked* parameter should be checked. Shown in Figure 12 is the Parcel and Traverse Course Entry Form that is associated with the geometry shown in Figure 11. As can be seen, the user has a wide degree of flexibility in editing the individual courses. The reader is referred to the September 2011 and June 2005 issues of Command of the Month for a full discussion on the operation of

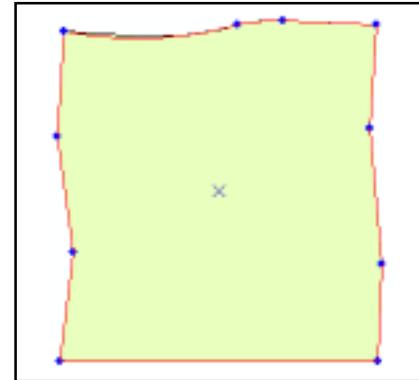


Figure 11
Revised Shape with Curves Introduced

the Parcel and Traverse Course Entry Form.

When line and curve features are to be created, they are stored in the current active layer. The [Set Active Layer] command can be used to establish the current active layer.

Notes

- a. Shown in Figure 13 is a diagram illustrating how the Maximum Chord Deflection and Minimum Number of Segments parameters are used in establishing a curve.
- b. Shown in Figure 14 is a diagram illustrating how the Curve Segment Length Tolerance parameter is used

Lines			Tangent Curves				Non-Tangent Curves			
Course Number	Direction	Distance	Radius and 1 of the other 3			Chord Direction, Radius and 1 of the other 3				
			Radius	Arc Length	Chord Length	Central Angle	Chord Direction	Arc Length	Chord Length	Central Angle
1		0.0	0.0	0.0	0.0	0.0	NE 87 53 24.6	0.0	0.0	26.217
2		0.0	0.0	0.0	0.0	0.0	NE 04 45 25.7	0.0	0.0	11.161
3	SE 87 16 3.6	553.80401	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	SW 3 15 54.4	616.04128	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	SE 4 37 11.7	816.79062	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	SW 2 1 57.2	575.61691	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	NAI 89 55 38.6	1899.6201	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Pan X (+ Right, - Left): 0.0 Pan Y (+ Up, - Down): 0.0 Zoom (> 1 In, < 1 Out): 1.0 # Tie-Line Courses: 0

Total Length: 7746.29782 Closure Distance: 0.00000 Error of Closure: 0.00000

Figure 12
Table Editing Dialog Box for Specific Course Editing

in establishing a curve. Line segments comprising a curve must be close to in length.

c. Shown in Figure 15 is a diagram illustrating how the Colinear Side Tolerance value is used to eliminate colinear sides, thereby resulting in a single course definition.

d. Shown in Figure 16 is a sample of how the Compress Compound Curve parameter can be used to compress compound curves into a single curve definition.

Summary

Not only can the [Line Segments to Curve] command be used to convert line segments into a curve definition, it also is an excellent tool for manipulating the courses comprising a polygon or polyline feature via the Parcel and Traverse Course Entry Form dialog box. For those who need the ability to reshape existing features we believe this command will provide the required functionality to perform this application.

The implementation of the [Line Segments to Curve] menu command is a recent enhancement and a direct result of a request from a CEDRA software user.

Users with a software support agreement should check with The CEDRA Corporation on how to obtain a software update so as to be able to utilize this new functionality.

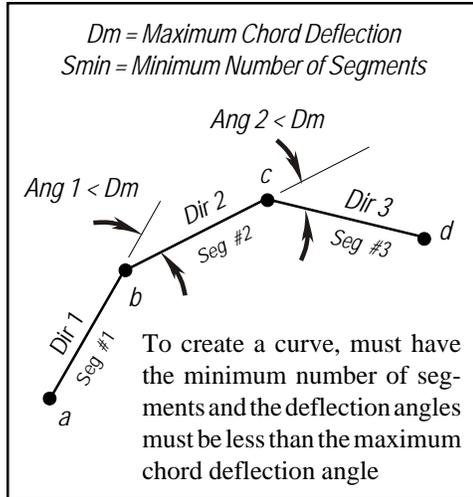


Figure 13 - Deflection Angle and Minimum Segments Parameters

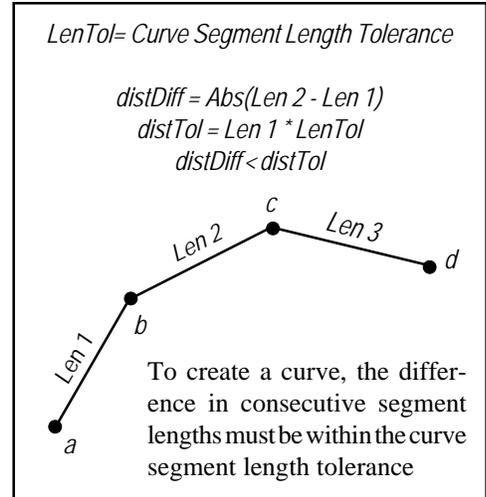


Figure 14 - Curve Segment Length Tolerance Parameter

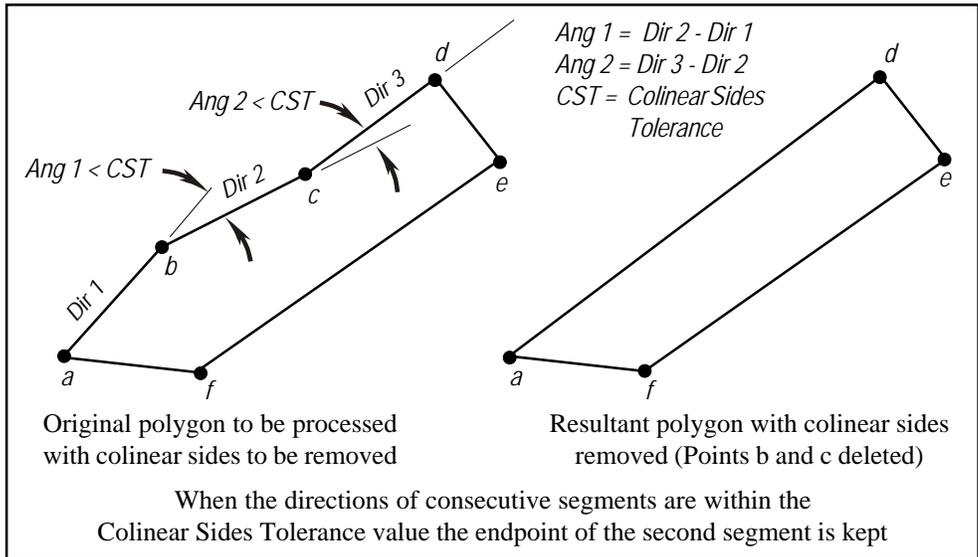


Figure 15 - Example of Colinear Sides Removal

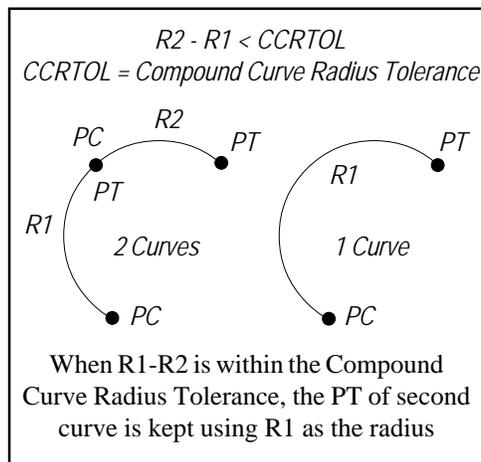


Figure 16 - Compress Compound Curve Parameter

As always, users who have a need for functionality that is not presently available in CEDRA software should feel free to forward these requests to CEDRA, as well as, any other comments or suggestion you may have.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.