RC tutorial 002 - Alignment With Spiral

=================================

Revised 2019-09-30

- This tutorial's goal is to teach you about clothoids in RailCOMPLETE tracks.
- Assumed RailCOMPLETE skills: Previous lessons.
- Assumed railway skills: You know about You know about railway geometry - lines, arcs and spirals (clothoids) in the XY plane.
- Time to spend here: 1 hour.

- Notice to users with non-English versions of AutoCAD – see footnote[1].
- This tutorial was prepared using software release 2018.22.1284 with Norwegian DNA version "2019.1 gamma","NO-BN;NO-0001;2019-09-28T20:19:00+01:00;2019.1".
- Note: If you are using AutoCAD version 2017 or older, then open the 2013-format version of the tutorial DWG file.
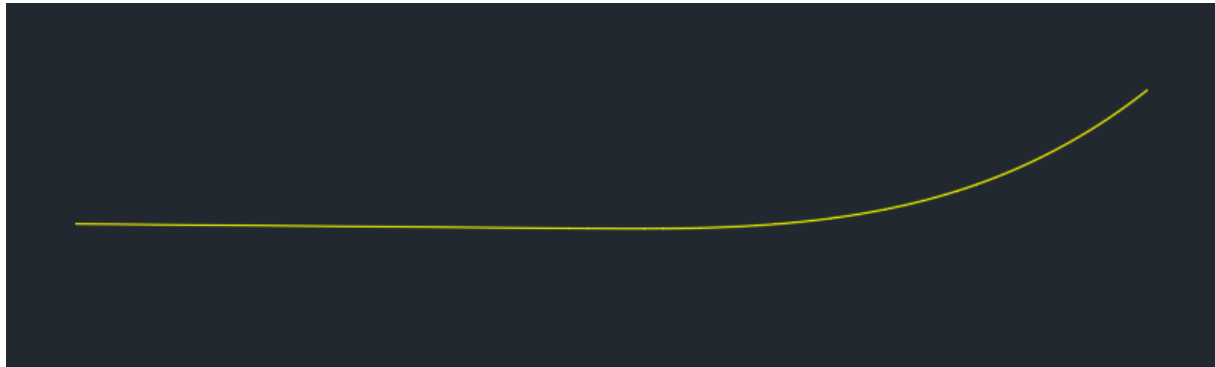
1. Start AutoCAD with RailCOMPLETE, then open the 'General Tutorials' folder and locate the DWG file named after this tutorial. You can either type RC-ShowGeneralTutorials or you can locate the button below the RC logo in the upper left corner of your AutoCAD window.

2. Activate the RC-ShowAlignmentGeometry tool to see your changes directly in modelspace while you make modifications to the alignment, and the alignment is selected.

3. Start the Alignment Manager and select the alignment "T01". It consists of a 250m long tangent line (a straightline segment), then a counter-clockwise turning clothoid from Inf (straight line) to radius 300 m, and finally a 100 m long counter-clocwise circular curve. Positive radius denotes a counterclockwise (CCW) curve, negative radius denotes a clockwise (CW) curve (as seen from the positive Z-axis).

---

[1] Your AutoCAD session has probably been started from a Windows shortcut of the type:
"C:\Program Files\Autodesk\AutoCAD 2019\acad.exe" /product ACAD /language "fr-FR"
("fr-FR" means "French language, France's version) similar. Native AutoCAD commands may have different names in your language pack, other than the COPY, COPYBASE, FIND etc that you see in our tutorial texts. In order to instruct AutoCAD to accept the native English command name, precede the native (English) command name by an underscore character, '_'. For instance: '_FIND' will start AutoCAD's native 'FIND' command even if you are using AutoCAD with the French language pack, where the command in French is called 'RECHERCHER'. If a command needs an argument 'ON', and the French menu says 'Allumer', then you can enter '_ON' to instruct AutoCAD to use the option's native name.

4. Activate the Alignment\Horizontal tab. You will see a datagrid displaying the actual horizontal geometry details of your alignment.

5. Check the "Extended View" checkmark to see more details, such as the clothoid parameter 'A', which equals the square root of the product L*R, where L = full clothoid length and R = end radius. By 'full length' we mean a clothoid that starts or ends with infinite radius (a straightline segment), such as in our T01 example.

6. Uncheck "Extended View" again.

7. Now, let us "tamper" with the clothoid. Select the alignment and locate one of the elongated grips along the clothoid segment. Hover over the grip and select "Convert to Line". The clothoid splits into two clothoids with a line segment between them. Also check out the changes shown in the Alignment Manager datagrid.

8. Use Ctrl+Z to revert to your original clothoid.

9. Now, use RC-BreakAlignment and break the alignment somewhere inside the clothoid. The clothoid splits into two adjacent clothoids. Check them out in the Alignment Manager datagrid.

10. Use RC-JoinAlignments and join the two alignments again. If you want to preserve the original alignment name, make sure that you select the low-mileage part first and the high-mileage part next.

11. Use the AutoCAD OFFSET command to make a regular 2D polyline copy of the original alignment with a constant offset of, say, 50 meters. Select this polyline and use RC-CreateAlignment to convert the 2D polyline into a RailCOMPLETE alignment object. Use railway track "Normalspor" as alignment type and name it "T02".

12. In the Alignment Manager, mark the T02 alignment and see that it consists of a large number of circular curves where the clothoid was. This is because an offset tangent line is a line, an offset circular curve is a circular curve, but an offset clothoid is not a clothoid. RailCOMPLETE chops an offset clothoid into small curve segments.

13. Draw your own alignments using RC-CreateAlignment to become familiar with geometry.

13. Play around with RC-BreakAlignment and RC-JoinAlignments.

14. Note: If you use the AutoCAD native JOIN command, it might join the graphics that you see into one polyline, but this will NOT join the RailCOMPLETE alignments "behind the scenes".

Please check our website www.railcomplete.com for updates.

Corrections and suggestions are welcome to support@railcomplete.no.

Thank you for using RC Tutorials!