

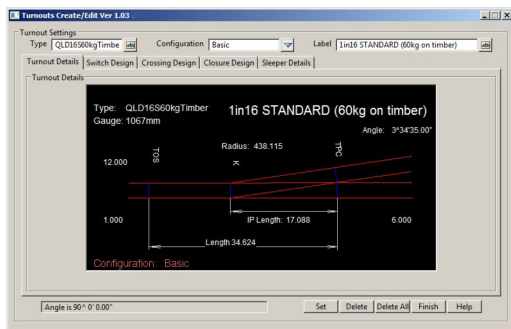


12d version 9 includes Track Design Tools to assist the rail designer in developing alignments and station yard designs.

### Turnout Create/Edit

The "Turnout Create/Edit" panel allows the user to enter parameters for turnouts such as Lead Length, IP to Heel Length and Turnout Angle.

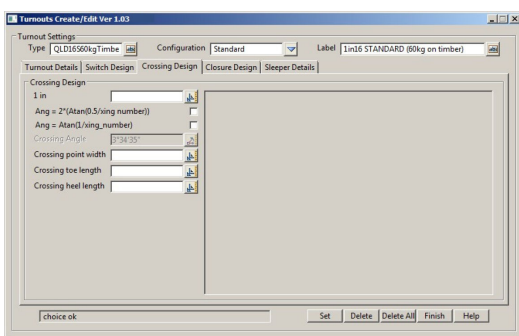
This tool will also be developed to include all special trackwork elements that may be required by a rail designer such as Similarflexure, Contraflexure, Tangential and Dual Gauge



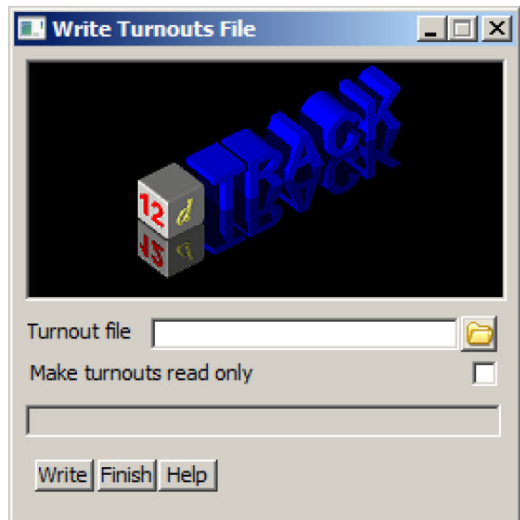
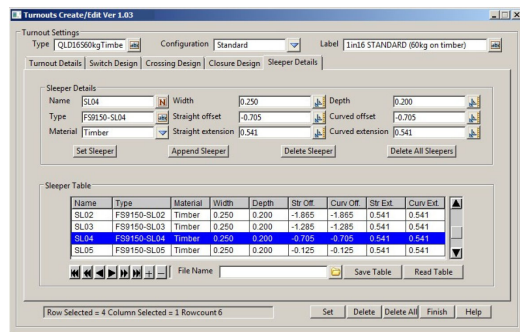
turnouts.

The "Turnout Place" panel to setout turnouts along an alignment will then use the parameters entered. The gauge and rail radii are also entered and these can be plotted for visualisation purposes.

Setout tables for sleeper sets can also be added to a turn-



out to allow sleepers to be plotted by setout distances along the stockrails and is useful for visualisation purposes.



### Turnout Reader/Writer

Tools for writing turnout parameters to an ASCII file and reading them back in to another project are provided.

### Place Turnouts

The "Place Turnouts" panel allows the rail designer to place a turnout into an alignment using a 12d function.

The positioning of the turnout is based on the chainage and direction of the turnout and the insertion point can be varied between the TOS, IP or one of the two APC points.

Turnouts can be places by various geometric "Reference" calculations relative to alignments such as "by chainage", "by vertex" and "by dropped point". The turnout is positioned according to the geometric data provided and should an alignment move the turnout will move also.

The "Place Turnouts" option is also able to plot the rails



**Turnout Place**

Place Turnout  
Function

Reference Geometry  
Reference Type: at chainage  
Reference String  
Direction: Normal  
Chainage Offset  
Chainage

Turnout Details  
Turnout Name  
Type  
Placement Node: TOS  
Placement Side: Left  
Centrelines Model  
Tangents Colour  
Centreline Colour

Show Rails | Show Sleepers | Import 12da File

Show Rails  
Plot Rails  
Rail Model  
Rail Colour

choice ok

Place Turnout | Finish | Help

**Cant panel**

Track Design  
Rail CL Alignment: RAIL CL NEW MC  
Speed: 80  
Gauge: Standard Gauge  
Virtual Cant: 20

Cant Elements  
0.000 ARC1  
115.244 ARC2  
206.650 SPR2

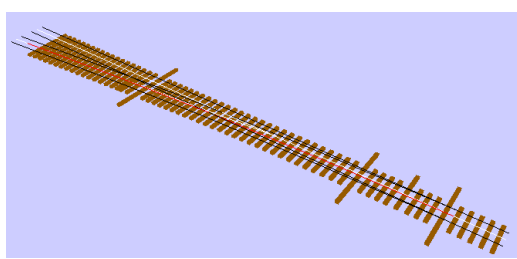
Element Data  
Type: ARC1  
Speed: 80  
Chainage: 0  
Radius: 299.4  
Eq Cant: 252.6653  
App Cant: 152

ARC1 Ch: 0.000 R: 299.400m V: 80km/hr  
Ce: 252.7mm Ca: 152mm Def: 100.7mm

--- dist: 115.244m Roc: 1in0.0 RocDef: 0.0mm/s  
ARC2 Ch: 115.2441 R: 299.4000m V: 80  
Ce: 252.7mm Ca: 152mm Def: 100.7mm

SET | INSERT | DELETE | DELETE ALL

OK | Finish



Particular curve constants for any gauge can be entered into the panel or one of three typical gauges can be selected.

The data can also be exported to an excel spreadsheet.

and sleepers for visualisation purposes.

Turnouts placed with functions can be self-positioning using several insertion "nodes" such as "Toe of Switch", "Intersection point" or on alignment opposite the "Theoretical Crossing point".

**Cant Calculation**

*The "Cant Calculator" panel is used to calculate cants along an alignment.*

Rate of change of Cant and Cant Deficiency are calculated based on the gauge constants entered into the panel.

Track Cant Calcs

STN	Change	Station Type	Speed	Radius	CR (20)	CR (152)	Def (20)	Def (152)	Rate of Change	Cant Range
1	4000.000	arc end	80.0	299.400	142.1	85.0	57.1	107.0	22.0	
2	4113.410	arc end	80.0	299.400	142.1	85.0	57.1	107.0	22.0	
3	4113.410	tr spiral start	80.0	299.400	142.1	85.0	57.1	107.0	22.0	
4	4205.564	tr spiral end	80.0	0.000	0.0	0.0	0.0	0.0	0.0	4 1088
5	4205.564	line start	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
6	4220.577	line end	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
7	4220.577	tr spiral start	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
8	4311.551	tr spiral end	80.0	302.000	140.0	84.0	56.0	105.0	21.0	4 564
9	4311.551	arc end	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
10	4448.587	arc end	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
11	4448.587	tr spiral start	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
12	4476.575	arc end	80.0	400.000	136.4	63.0	45.4	86.1	17.1	
13	4476.575	tr spiral start	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
14	4705.968	arc end	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
15	4705.968	tr spiral start	80.0	302.000	140.0	84.0	56.0	105.0	21.0	
16	4785.964	tr spiral end	80.0	0.000	0.0	0.0	0.0	0.0	0.0	-5 -952
17	4785.964	line start	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
18	4855.747	line end	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
19	4855.747	tr spiral start	80.0	0.000	0.0	0.0	0.0	0.0	0.0	
20	4910.814	tr spiral end	80.0	300.000	141.8	85.0	56.8	106.8	21.8	-7

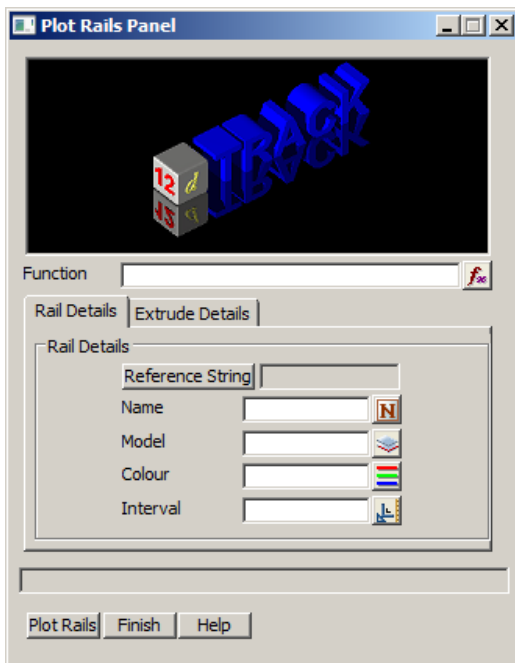
**Plot Rails**

# TRACK

**Rails can be plotted using the "Plot Rails" panel. This option uses the cant calculations and gauge to plot the rail levels at a regular interval along the alignment.**

Rail extrusion techniques can be used in 12d to produce a visualisation of the project.

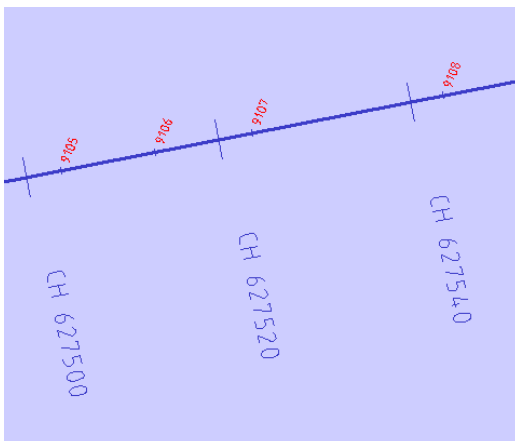
## Advanced Rail Alignments



**12d alignments also have the ability to be generated by joining elements that are fixed in position or can have various degrees of freedom to float into place relative to adjacent elements whose positions have been resolved based on their own location parameters.**

Computed rail alignments are alignments that are positioned relative to other rail alignments.

These alignments have the ability to reposition automati-



cally should the reference alignments move.

In conjunction with the turnout placement tool a group of rail alignments can be generated that are self-calculating based on the choices of turnouts made.

## Chainage Equalities

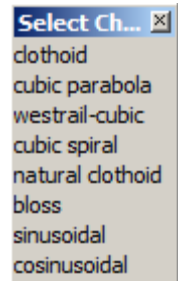
**Chainage equalities can be placed at any point along an alignment using several methods of definition.**

These can be point equalities at any chainage or offsets calculated from Kilometre posts.

- K-post coord
- K-post chainage
- K-post relative
- Internal equality

## Rail Transitions

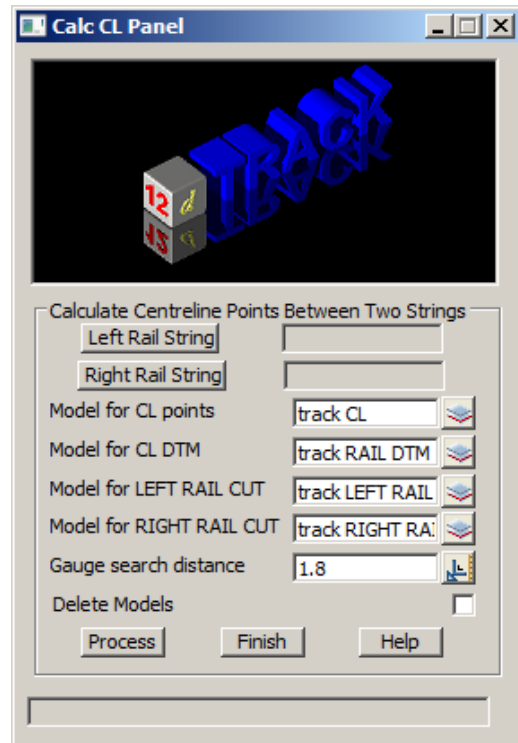
12d calculates various Rail Transition types such as Clothoid, Cubic spiral and Cubic Parabola.



## Calculate Centre from Rails

**The "Calculate centreline points from rails" panel generates a sequence of points between two surveyed rail strings.**

These points can be used to check slew and best fit between alignments generated by 12d and the original surveyed rail alignment.



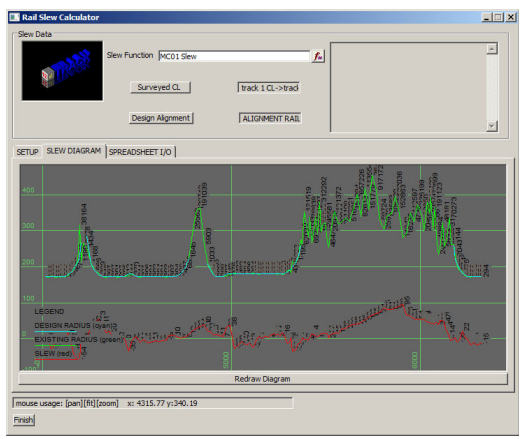


# TRACK

The tool also develops strings across the rails representing the “Low Rail Height”.

These can be viewed in a long section of an alignment to determine the track lift and lower along the alignment.

The “Slew-Calculation” panel also plots the radius at each point based on the versine of surrounding points.



12D Track Slew Data														
Point #	Change	Sum East	Sum North	Sum RL	Design East	Design North	Design RL	Slew Offset	Track LR	Versine Scales	Design Scales	Slew Offset		
#	m	m	m	m	m	m	m	mm	m	mm	mm	mm	mm	mm
1	4091.255	1096.317	1737.288	0.000	1096.317	1737.287	30.272	0	30272					
2	4091.872	1108.326	1758.155	30.228	1108.326	1758.155	30.242	-7	13	218.58	-209.40			
3	4092.895	1118.316	1775.276	30.160	1118.316	1775.276	30.242	3	-13	261.89	-209.40			
4	4094.951	1126.307	1788.783	30.090	1126.307	1788.783	30.242	-7	-13	287.61	-209.40			
5	4097.951	1132.317	1794.639	30.000	1132.317	1794.639	30.242	-7	-13	320.58	-209.40			
6	4101.951	1136.317	1798.798	29.907	1136.317	1798.798	30.242	-7	-13	318.07	-209.40			
7	4106.951	1138.317	1800.298	29.807	1138.317	1800.298	30.242	-7	-13	302.86	-209.40			
8	4112.951	1138.317	1800.298	29.692	1138.317	1800.298	30.242	-7	-13	268.15	-209.40			
9	4119.951	1136.317	1795.298	29.564	1136.317	1795.298	30.242	-7	-13	214.18	-209.40			
10	4128.951	1132.317	1788.000	29.419	1132.317	1788.000	30.242	-7	-13	150.00	-209.40			
11	4139.951	1126.317	1778.000	29.261	1126.317	1778.000	30.242	-7	-13	85.82	-209.40			
12	4152.951	1118.317	1764.000	29.085	1118.317	1764.000	30.242	-7	-13	21.64	-209.40			
13	4167.951	1118.317	1756.298	28.899	1118.317	1756.298	30.242	-7	-13	-133.89	-209.40			
14	4184.951	1116.317	1744.000	28.700	1116.317	1744.000	30.242	-7	-13	-277.72	-209.40			
15	4203.951	1112.317	1728.000	28.485	1112.317	1728.000	30.242	-7	-13	-418.07	-209.40			
16	4224.951	1106.317	1708.000	28.253	1106.317	1708.000	30.242	-7	-13	-554.14	-209.40			
17	4247.951	1098.317	1684.000	27.995	1098.317	1684.000	30.242	-7	-13	-684.22	-209.40			
18	4272.951	1088.317	1656.000	27.711	1088.317	1656.000	30.242	-7	-13	-806.30	-209.40			
19	4300.951	1076.317	1624.000	27.395	1076.317	1624.000	30.242	-7	-13	-919.38	-209.40			
20	4332.951	1062.317	1588.000	27.047	1062.317	1588.000	30.242	-7	-13	-1023.46	-209.40			

- Visualisation

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