

# Bentley Rail Overhead Line V8i SELECT Series 1 Overview

# High Level Functions

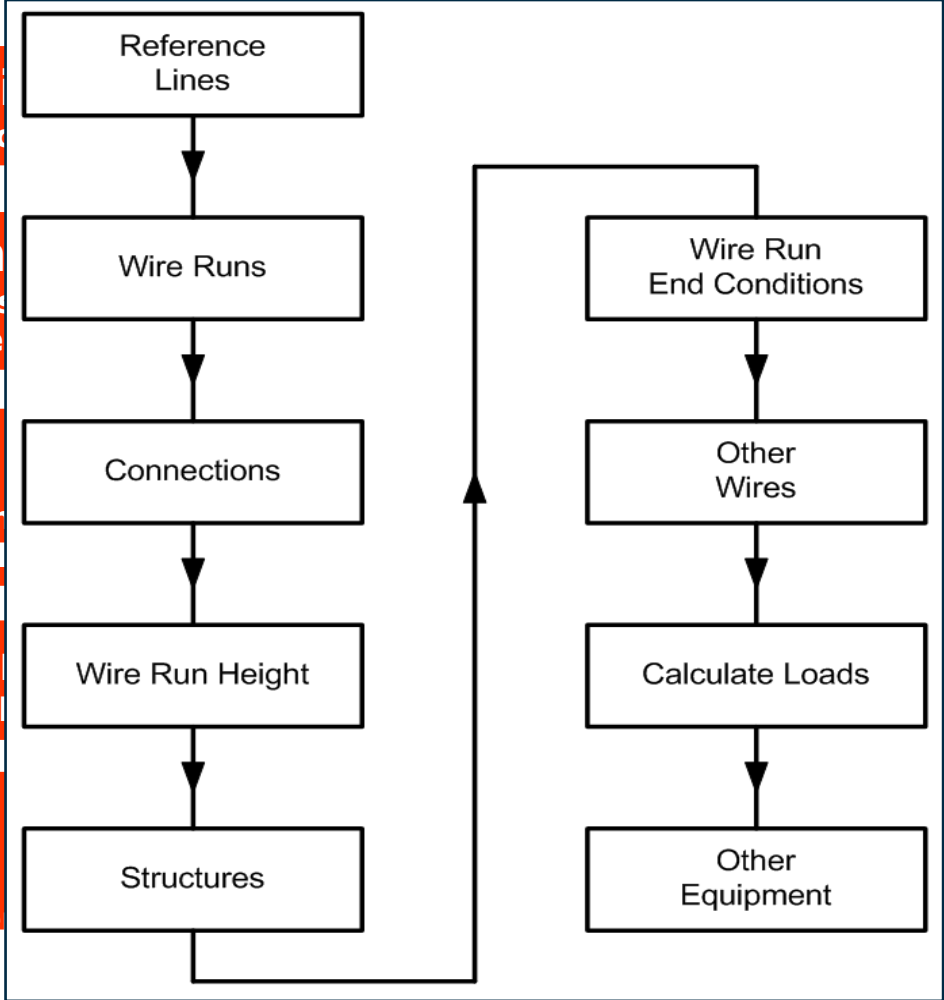


- Design of heavy rail OLE
- Existing and new systems
- Scheme and detailed design
- Allow local rules configuration
- Integrated into design process



# BROL - System

- Reference Lines**  
(Span distance etc)
- Wire Design**  
(connection points, height and stagger)
- Structures,**  
(selected from templates and placed in model)
- Wire Tension**  
and mid-span angles
- Other Equipment,**  
wires, transformers



- Calculate Foundation**  
S (export results to third party)
- Generate reports in XML**  
format (structural and wire)
- Export Bill of Materials**  
Quantities in XML
- Links to other systems**
- Export Production Drawings**  
(plans and cross sections)

# System Configurable Parameters

## Wire System

- Carrier Wire.
- Catenary Wire.

## Stagger Calculations

- Registration Arm Axial Force.
- Wind Blow Off Left / Right.
- EU Pantograph Blow Off Exceedence.
- EU Maximum Wind Blow Off.

## Span Lengths

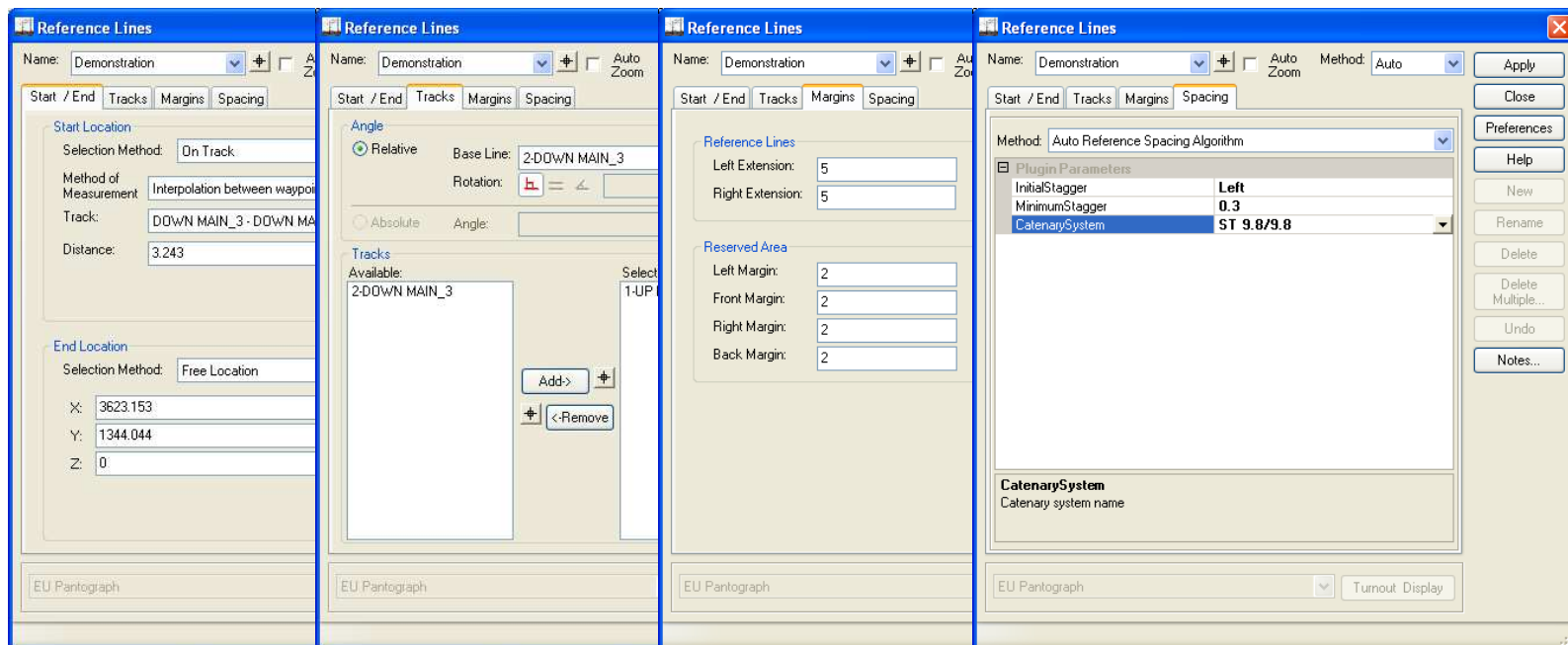
- Algorithms based upon catenary system.

## Height Calculations

- Carrier Wire Sag.
- Chainage.
- Gradient.
- Isolation Distance.
- Mid Span Encumbrance.

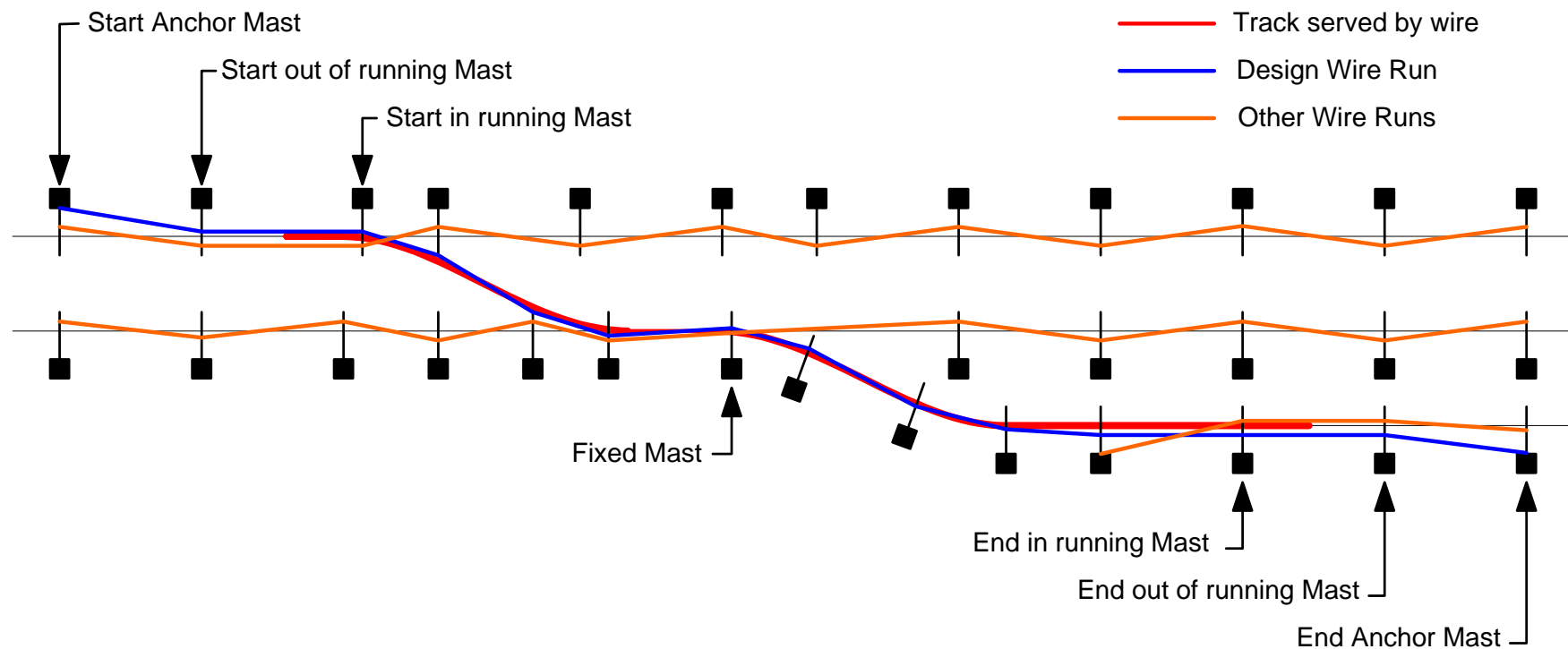
# Reference Lines

- Place manually at known locations, relative to fixed locations, or automatically based upon rules.

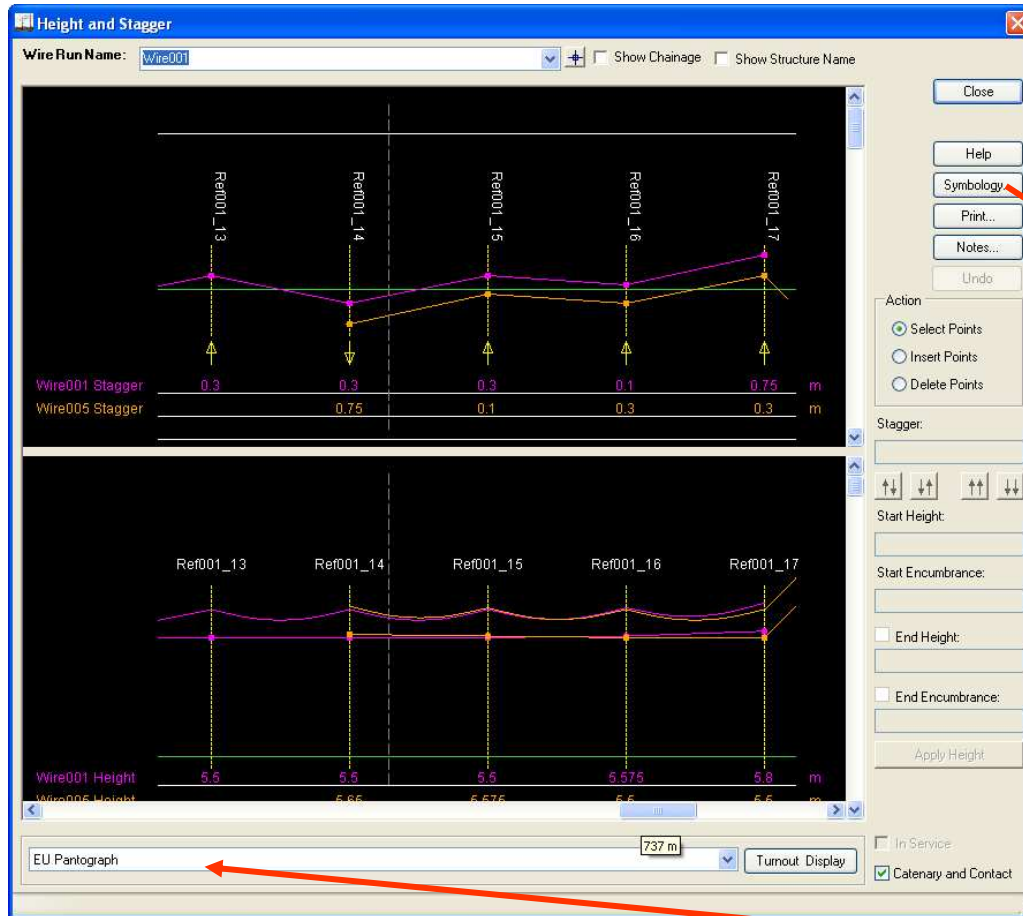


# Wire Runs

- Wire runs associated with track paths in network



# Height and Stagger



## Stagger Calculations

- Axial force.
- EU blow-off exceedance.
- EU maximum wind blow off.
- Wind Blow off left
- Wind blow off right

## Height Calculations

- Carrier wire sag.
- Chainage.
- Gradient.
- Isolation distance.
- Mid-wire encumbrance

**Additional analysis routines can be added to suit Client's requirements**

# Structures

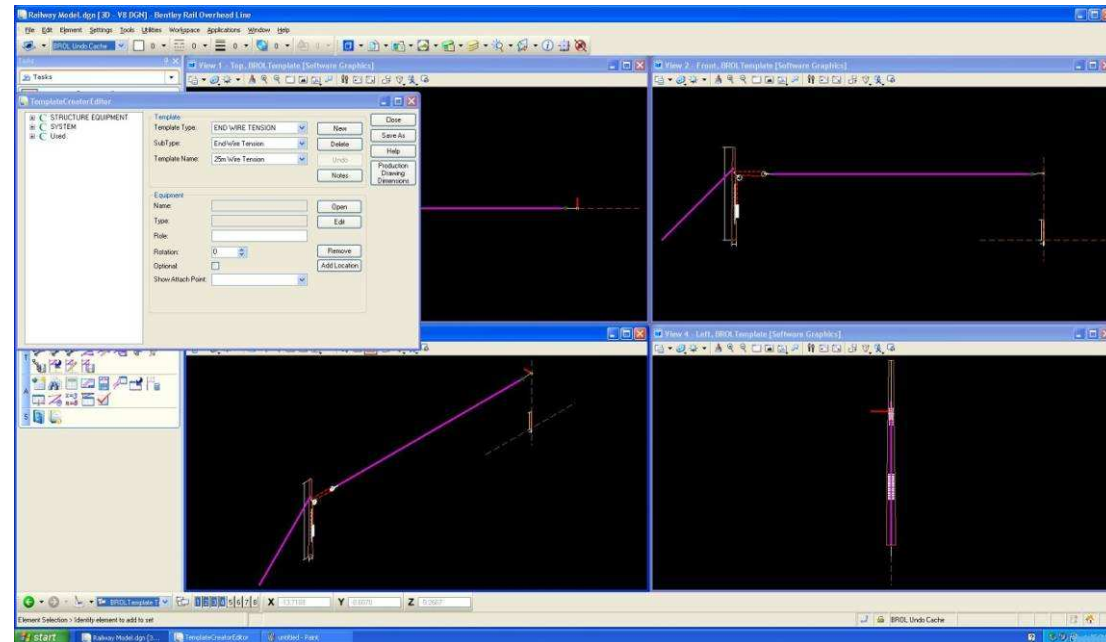
- Structures types include:-
  - Mast – single
  - Mast – pair
  - Portal
  - Headspan (future development?)
- Place individually or in multiples
- Templates are used to save repeated effort and encourage standardisation

The screenshot shows the 'Create Structure' dialog box. The 'Template' dropdown is set to '2-track Portal', 'Method' is 'Single', and 'Classification' is 'New'. The 'Start Location' section has 'Selection Method' set to 'Free Location' and empty input fields for X, Y, and Z. The 'End Location' section also has 'Selection Method' set to 'Free Location' and empty input fields for X, Y, and Z. Buttons for 'Apply', 'Close', 'Preferences', and 'Help' are on the right.



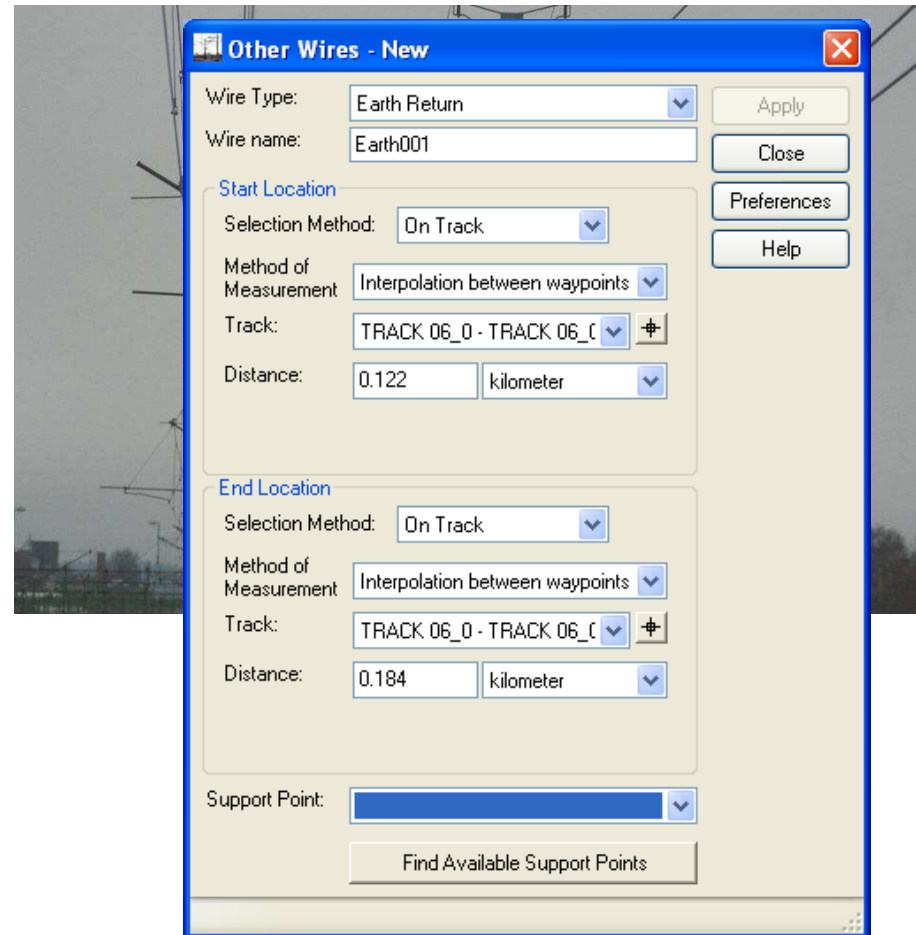
# Wire Fixity

- End Wire Fixity tension
- Mid-Wire Fixity
- Templates save repeated effort



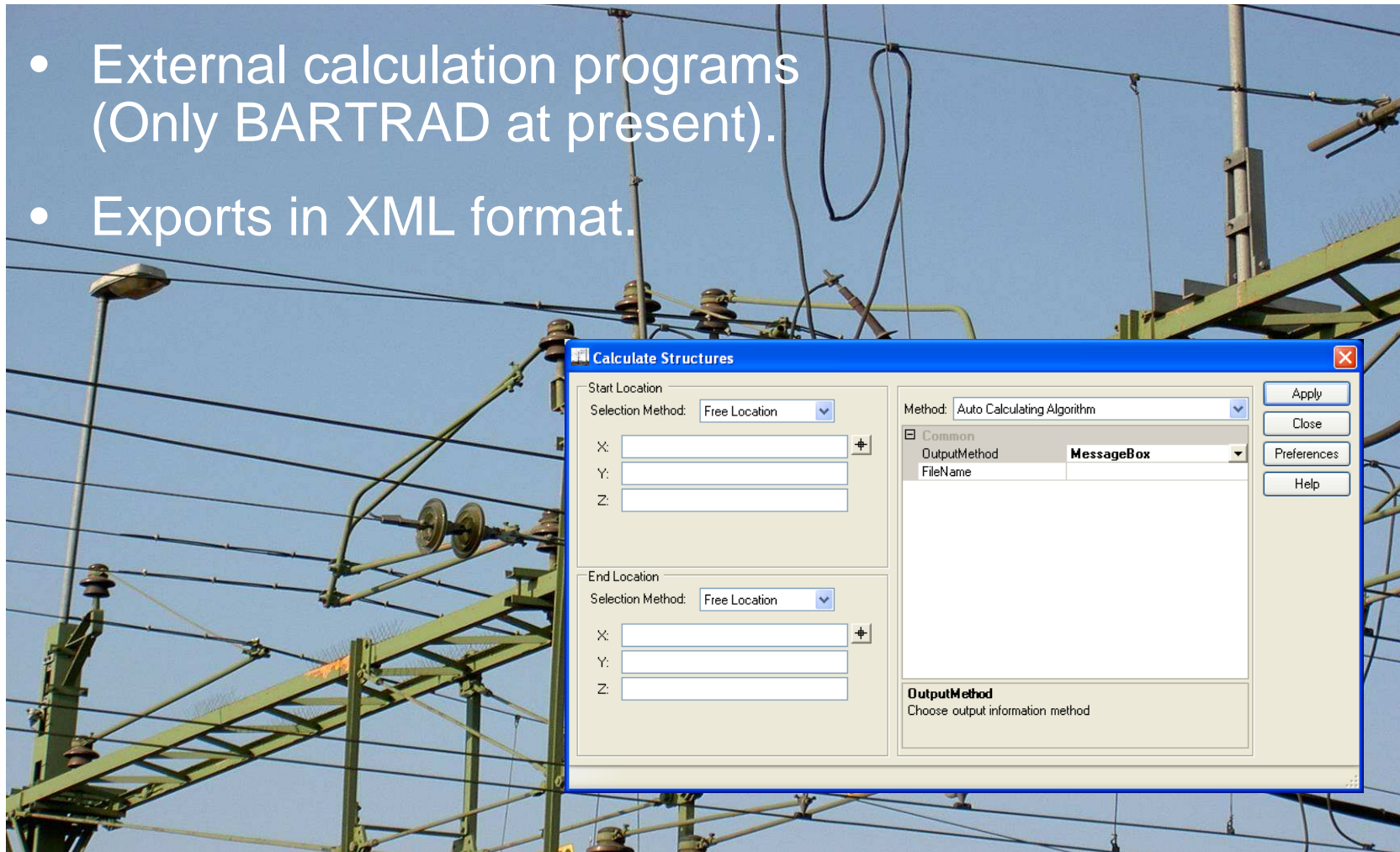
## Other Wires and Equipment

- Wiring for 3-Phase or Earth Return
- Transformers
- Post restraints
- In span equipment
- Span bonding



# Calculate Loads

- External calculation programs (Only BARTRAD at present).
- Exports in XML format.



# Customised Reports

The image displays three overlapping windows from the Bentley InRoads Report Browser software. The top window, titled "Create Report", allows users to select a report type (currently "Structure Report") and view its description ("Reporting engine for filtering structure data"). The middle window, titled "Bentley InRoads Report Browser - D:\Proj\Bentley OLD Italian Demo\CasalinaNew Structures.xml", shows a tree view of report templates under "Structure Reports", including "Construction.xml", "Locations.xml", "Notes.xml", "OtherWires.xml", and "WireRuns.xml". The bottom window, titled "Bentley InRoads Report Browser - D:\Proj\Bentley OLD Italian Demo\CasalinaWire\_NEW002.xml", displays a table of wire run data.

Wire Run Name	First Attach Point Location (x, y, z)	Second Attach Point Location (x, y, z)	Length	Gradient
NEW002	(15751.622, 26630.362, 56.268)	(15771.716, 26583.483, 55.955)	51.005	0.0
NEW002	(15771.716, 26583.483, 55.955)	(15793.145, 26530.665, 55.796)	57.000	0.0
NEW002	(15793.145, 26530.665, 55.796)	(15813.524, 26481.738, 55.678)	53.002	0.0
NEW002	(15813.524, 26481.738, 55.678)	(15831.773, 26434.278, 55.503)	50.848	0.0
NEW002	(15831.773, 26434.278, 55.503)	(15838.962, 26417.884, 55.441)	17.901	0.0
NEW002	(15838.962, 26417.884, 55.441)	(15847.603, 26394.803, 55.356)	24.645	0.0
NEW002	(15847.603, 26394.803, 55.356)	(15865.972, 26351.289, 55.194)	47.232	0.0
NEW002	(15865.972, 26351.289, 55.194)	(15884.788, 26303.699, 55.079)	51.175	0.0
NEW002	(15884.788, 26303.699, 55.079)	(15900.794, 26265.773, 54.998)	41.165	0.0
NEW002	(15900.794, 26265.773, 54.998)	(15912.564, 26234.888, 54.934)	33.052	0.0
NEW002	(15912.564, 26234.888, 54.934)	(15926.883, 26200.590, 54.862)	37.168	0.0
NEW002	(15926.883, 26200.590, 54.862)	(15939.021, 26168.297, 54.794)	34.498	0.0
NEW002	(15939.021, 26168.297, 54.794)	(15955.840, 26127.052, 54.706)	44.543	0.0
NEW002	(15955.840, 26127.052, 54.706)	(15971.264, 26085.745, 54.622)	44.093	0.0
NEW002	(15971.264, 26085.745, 54.622)	(15980.073, 26039.186, 54.470)	50.715	0.0

# What's New in BROL V8i SELECT series 1

- In Built CAD functionalities |Based on MicroStation PowerPlatform
- BROL commands as Task Navigation | ie. Standard MicroStation Interface
- Network model based on Bentley Rail Track geometry | ie. Enhanced integration with Bentley Rail Track geometry - Import \*.alg alignment file
- Create/Edit Equipment/Structure library using MicroStation cells | ie. It's a lot easier to create and edit the component library for catenary system(s) based on your markets....
- Drawing production and annotation tools – Plan and Cross Section generators
- Internationalisation of BROL | ie. Now translatable in different languages

# BROL Select series 1 continued

- Production drawing tool.
- User defined plans and cross sections.



## Templates

- Templates are made from assemblies.
- Assemblies are made up of components.
- Assemblies have connection zones.
- Place assemblies into templates.
- Templates are parametric.
- Templates are user definable.
- Hierarchy.
- Associate 3D model or graphics.

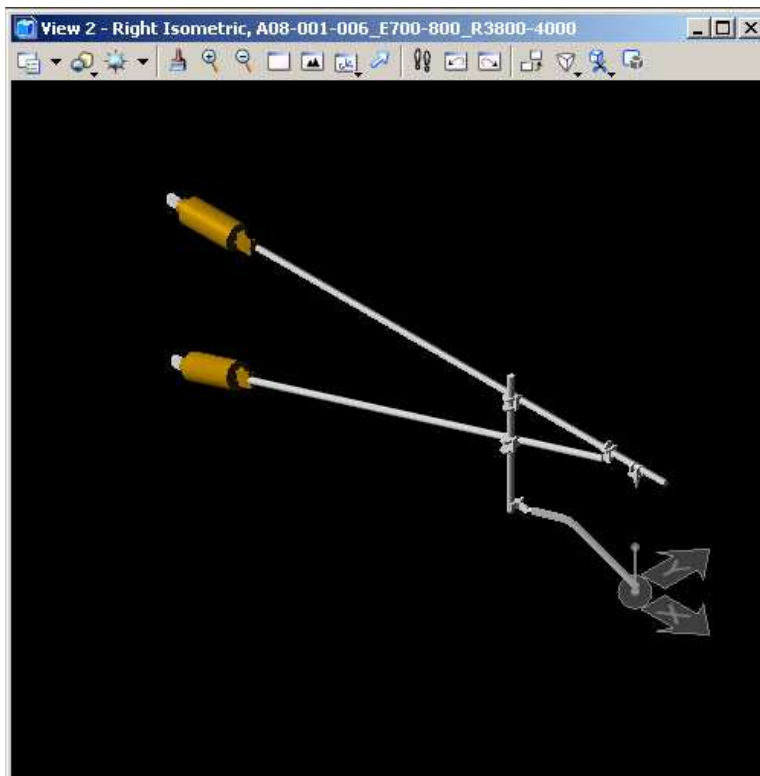
## Assembly Library Management

- Assembly geometry held in cell library .dgnlib
- BROL uses cell folder containing multiple .dgnlibs
- Typically create dgnlibs for different types of assemblies or system types
- Set location for dgnlibs, this location must be set in MicroStation
- Note: BROL has a default set of cells required for the program to operate



# Assembly Models

- 1 assembly = 1 model in dgnlib



The screenshot shows the 'Models' window in a CAD application, displaying a list of models. The window title is 'Models' and it has a standard toolbar. The list is organized into columns: 'Type', '2D/3D', 'Name', and 'Description'. The models listed include various 'UC Mast' and 'Cantilever Arm - Pull' components, along with 'Lattice post' models. The model '035-834-098' is highlighted in blue.

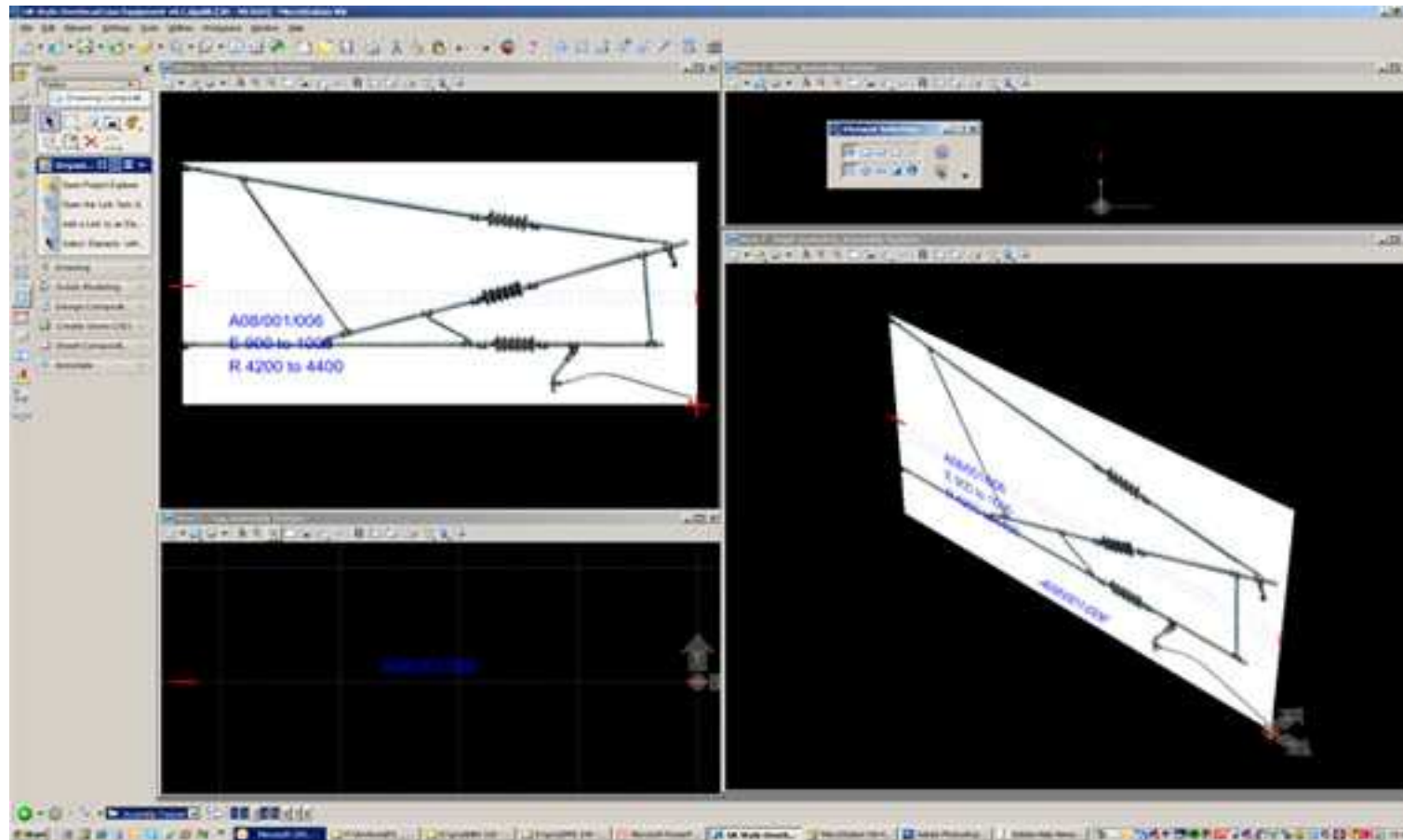
Type	2D/3D	Name	Description
		035-434-086	UC Mast 356x358x8600
		035-434-088	UC Mast 356x358x8800
		035-434-090	UC Mast 356x358x9000
		035-434-092	UC Mast 356x358x9200
		035-434-094	UC Mast 356x358x9400
		035-434-096	UC Mast 356x358x9600
		035-434-098	UC Mast 356x358x9800
		035-834-0xx Base	UC Mast 254x254x
		035-834-050	UC Mast 254x254x5000
		035-834-052	UC Mast 254x254x5200
		035-834-054	UC Mast 254x254x5400
		035-834-056	UC Mast 254x254x5600
		035-834-058	UC Mast 254x254x5800
		035-834-060	UC Mast 254x254x6000
		035-834-062	UC Mast 254x254x6200
		035-834-064	UC Mast 254x254x6400
		035-834-066	UC Mast 254x254x6600
		035-834-068	UC Mast 254x254x6800
		035-834-070	UC Mast 254x254x7000
		035-834-072	UC Mast 254x254x7200
		035-834-074	UC Mast 254x254x7400
		035-834-076	UC Mast 254x254x7600
		035-834-078	UC Mast 254x254x7800
		035-834-080	UC Mast 254x254x8000
		035-834-082	UC Mast 254x254x8200
		035-834-084	UC Mast 254x254x8400
		035-834-086	UC Mast 254x254x8600
		035-834-088	UC Mast 254x254x8800
		035-834-090	UC Mast 254x254x9000
		035-834-092	UC Mast 254x254x9200
		035-834-094	UC Mast 254x254x9400
		035-834-096	UC Mast 254x254x9600
		035-834-098	UC Mast 254x254x9800
		A08-001-006_E600-700_R3800-4000	Cantilever Arm - Pull
		A08-001-006_E600-700_R4000-4200	Cantilever Arm - Pull
		A08-001-006_E600-700_R4200-4400	Cantilever Arm - Pull
		A08-001-006_E700-800_R3800-4000	Cantilever Arm - Pull
		A08-001-006_E700-800_R4000-4200	Cantilever Arm - Pull
		A08-001-006_E700-800_R4200-4400	Cantilever Arm - Pull
		A08-001-006_E800-900_R3800-4000	Cantilever Arm - Pull
		A08-001-006_E800-900_R4000-4200	Cantilever Arm - Pull
		A08-001-006_E800-900_R4200-4400	Cantilever Arm - Pull
		A08-001-006_E900-1000_R3800-4000	Cantilever Arm - Pull
		A08-001-006_E900-1000_R4000-4200	Cantilever Arm - Pull
		A08-001-006_E900-1000_R4200-4400	Cantilever Arm - Pull
		Default	Master Model
		Lattice post 5200	
		Lattice post 6000	
		Lattice post 6800	

## Level of Detail

- All cells should have attachments and nominal extents
- Content may vary according to level of detail required in final model, simplest to complex:-
  - Texture on rectangular plane surface
  - Stick diagram
  - Simplified 3D model
  - Detailed 3D model
- Assemblies modelled at different levels of detail may be mixed in the same design

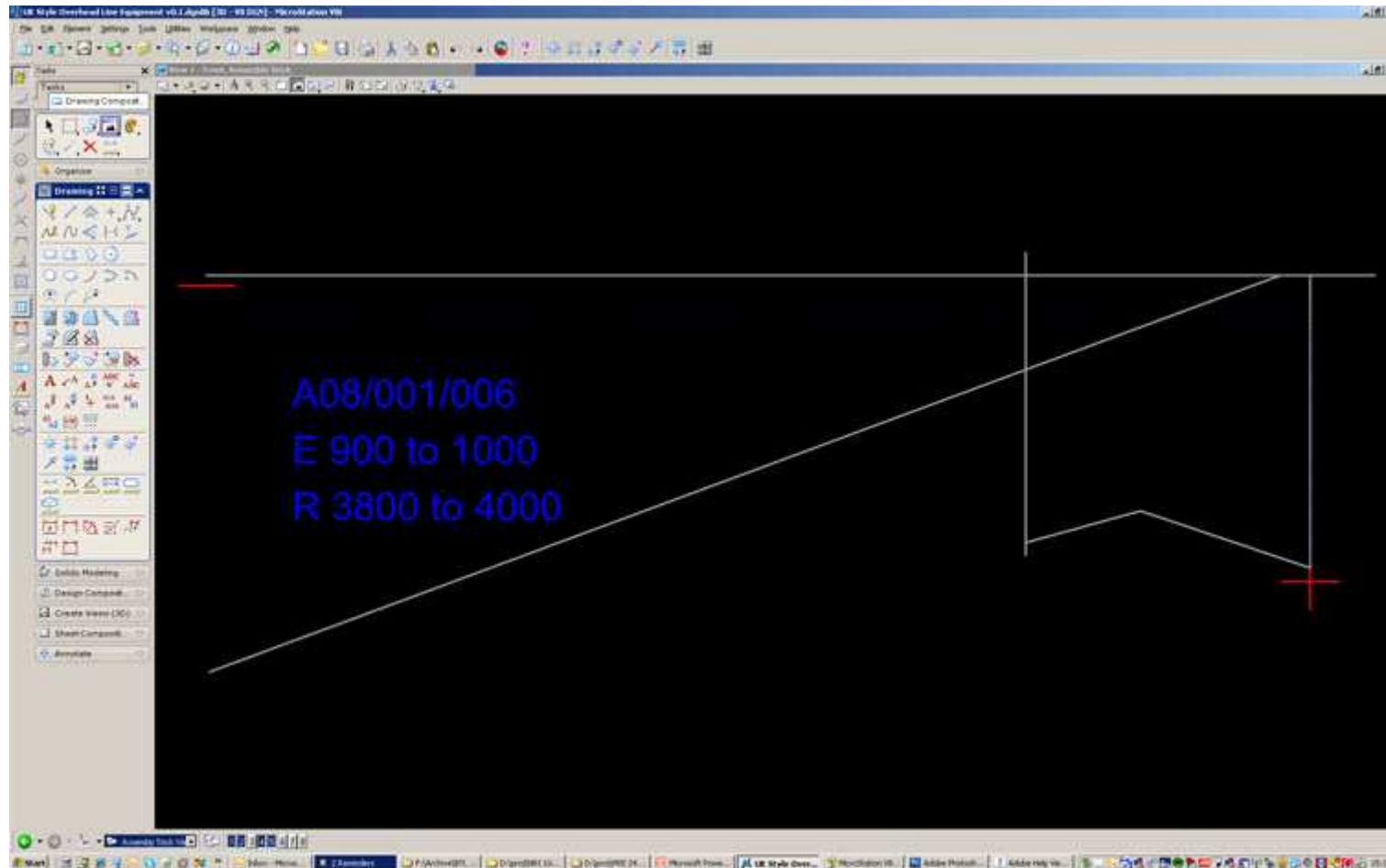
# Texture

- Suitable for simple design and quick representational type VR



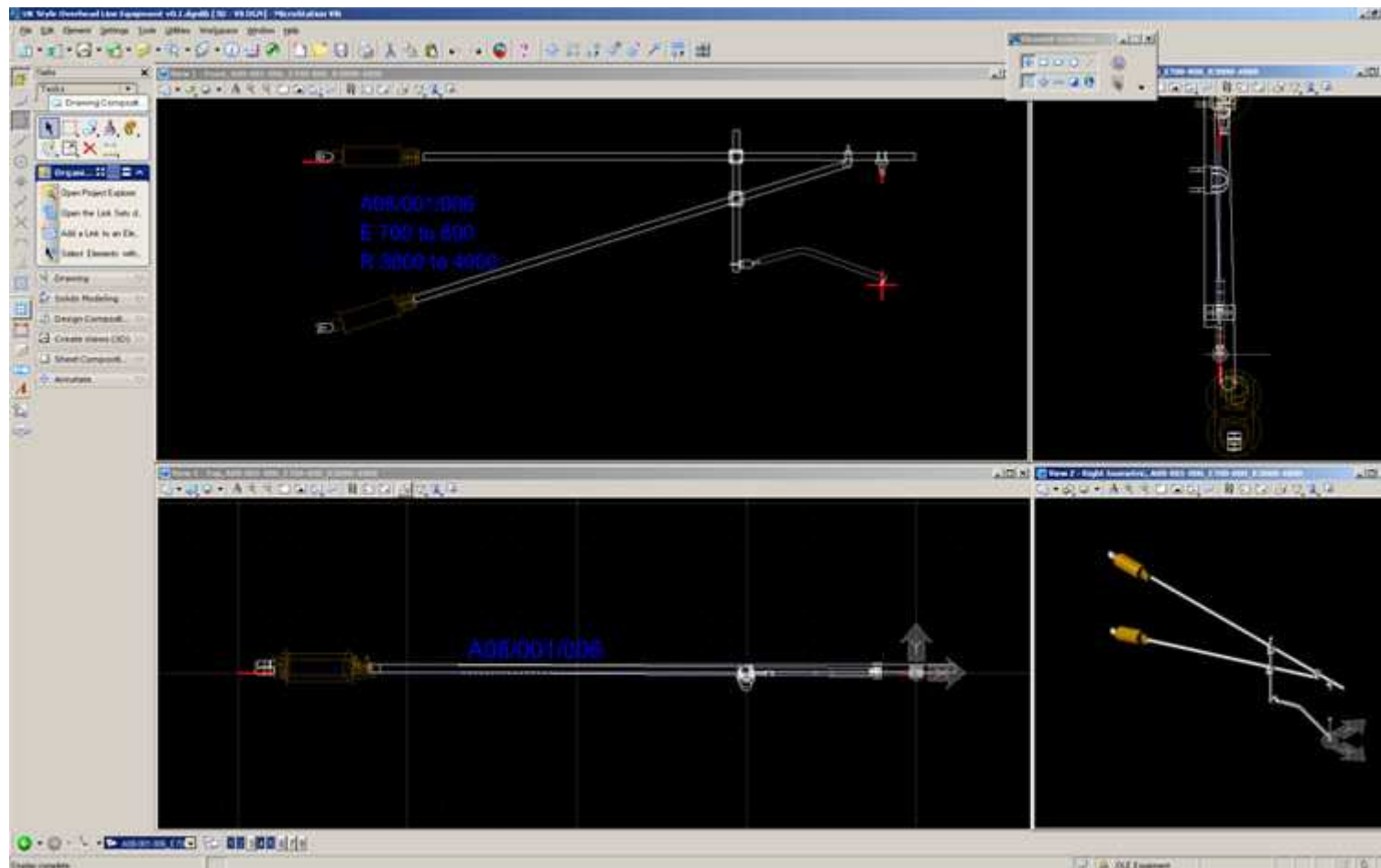
# Stick Diagram

- Suitable for drawing production, not good for 3D visualisations



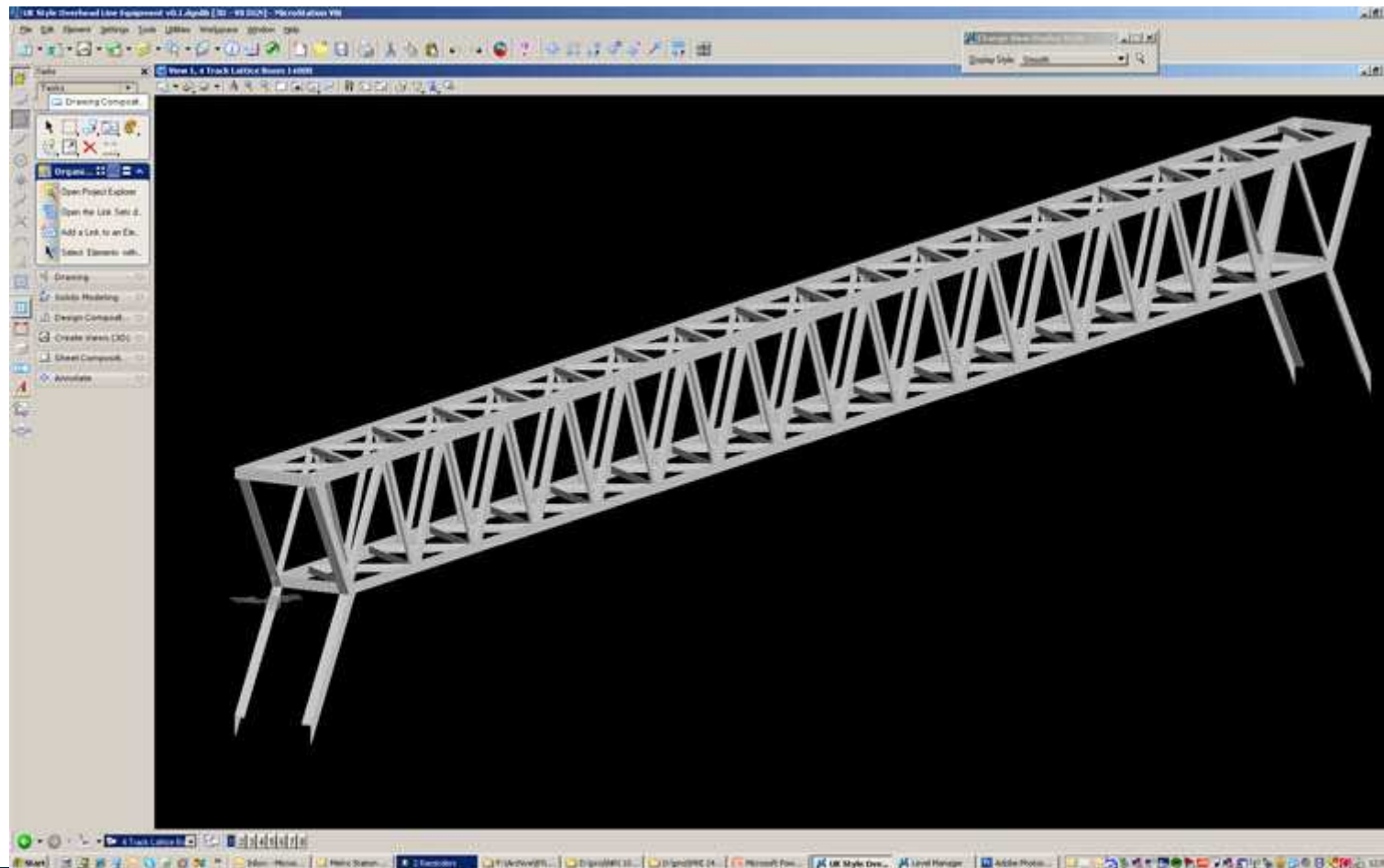
## Simplified 3D

- Good for 3D visualisation for clash detection, reasonable visual fidelity



## Detailed 3D

- As complicated as you need. High level of detail drives model size and processing time.



# Customised Reports

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## Detailed 3D

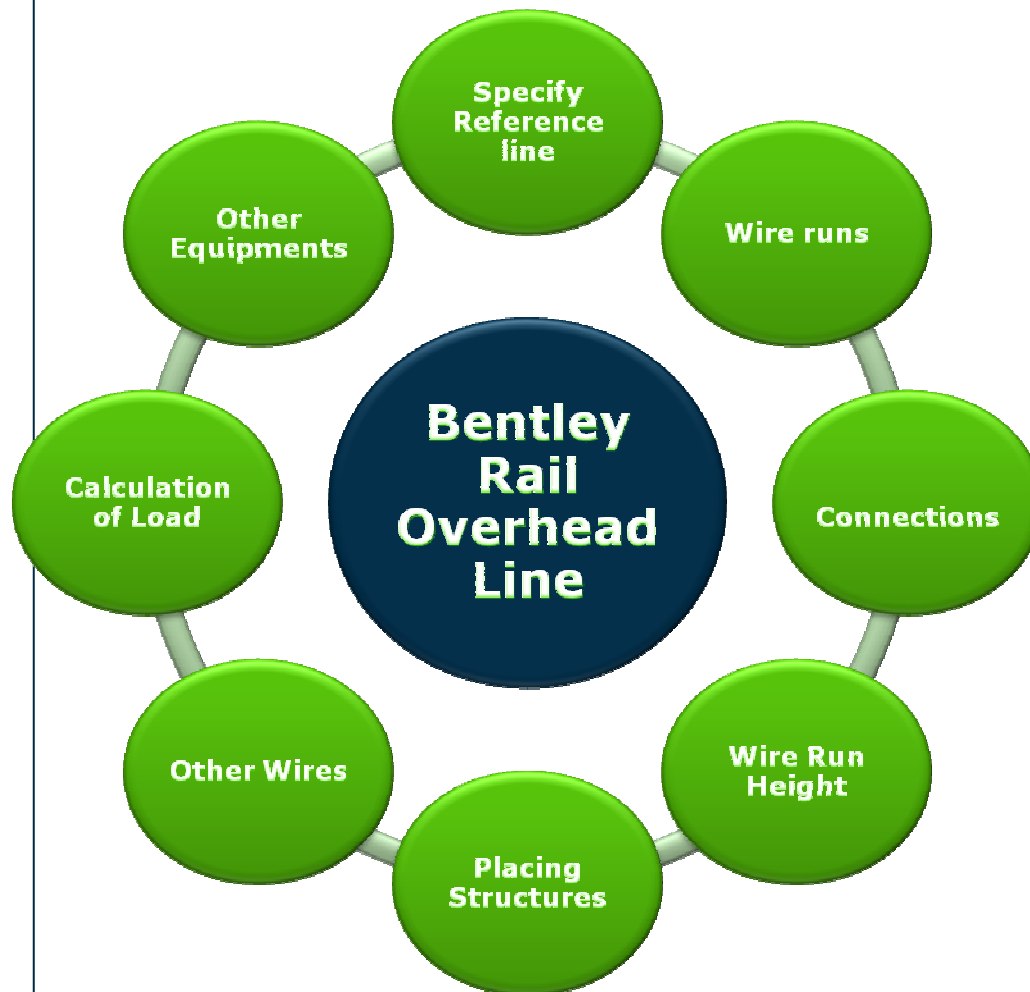
- Good for high end visualisation using Luxology engine.



Note: in this case the model was created manually not using BROL. It shows the level of detail and visual fidelity that can be achieved.



## Bentley Rail Overhead Line



- ✓ Automates standard workflows for design of traction power systems
- ✓ Provides accurate information for design decision support
- ✓ Delivers data for construction, Bills of Materials, project costs, on-site delivery schedules and pick lists
- ✓ Improves productivity during both design and construction
- ✓ Delivers complete set of information for the long term maintenance and asset management of the system
- ✓ Integrates with Bentley Rail Track

# Questions....



Image taken from Bentley V8i Virtual Reality model of Luton Station