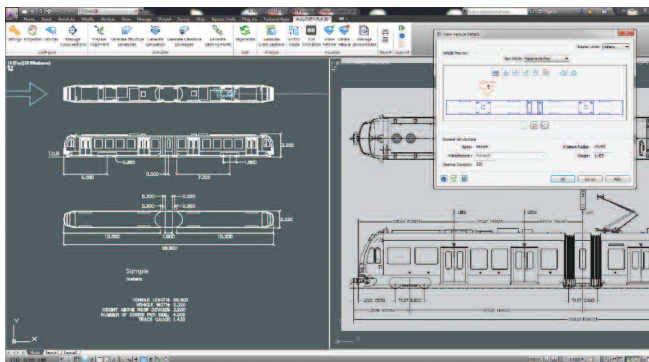


MODEL, ANALYZE AND VISUALIZE IN 3D



AutoTURN RAIL is a CAD-based program that generates three-dimensional light rail vehicle (LRV) swept path envelopes along the rail tracks based on a given vehicle's specifications. When the static and dynamic envelopes are generated for the LRV, both horizontal and vertical alignments (including cant/superelevation) are considered. This advanced rail design and analysis solution will expedite the clearance analysis for evaluating new track layout or verifying LRVs on the existing rail track.



» Easily recreate the exact vehicle you need for analysis even if it may contain module configurations that are not on the predefined list of parts in the software.

» LIGHT RAIL VEHICLE CREATION

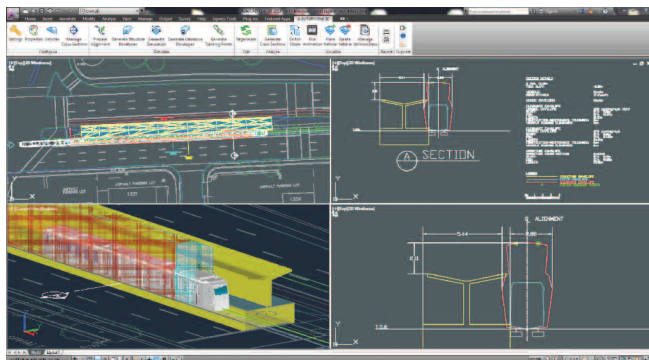
AutoTURN RAIL allows you to easily recreate the vehicle you need by assembling parts from a predefined list (modules with set truck and axle arrangements). If a part for your vehicle is not on the list, simply use the software to create the new part you need. Once the vehicle configuration is defined, set its dimensions to match the vehicle manufacturer's specifications.

» LIGHT RAIL VEHICLE SIMULATIONS

A vehicle simulation can be created along any part of a prepared alignment. In AutoCAD, horizontal and vertical alignments can be created from polylines. The vehicle simulations will react to considerations of cant/superelevation information. Designers can see entire vehicles not only bend around curves and move up and down slopes, but also tilt and twist as they transition through canted/superelevated portions of a prepared alignment.

» CROSS SECTION VIEW DETAILS

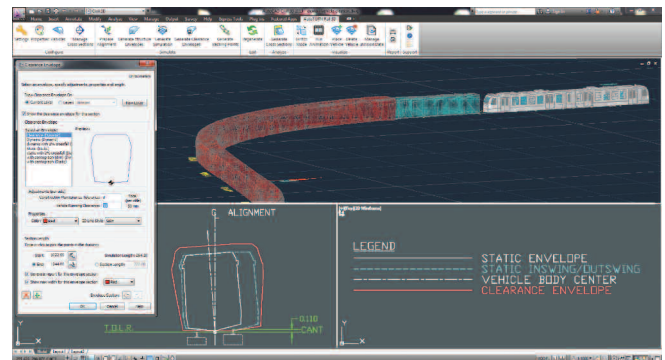
Automatically draft 2D cross section view details to comprehensively check overhead and ground level clearance concerns by simply clicking a point or station along the alignment, generating a cross section. Control the information on the report, show static/dynamic/clearance envelopes, tracking points, and structure envelopes all relative to the alignment centerline. Designers will be able to see how the alignment curve and cant/superelevation affect the vehicle.



» Accurately scale dimensions off the full scale report vehicle envelope clearance and tracking points relative to any structure envelopes.

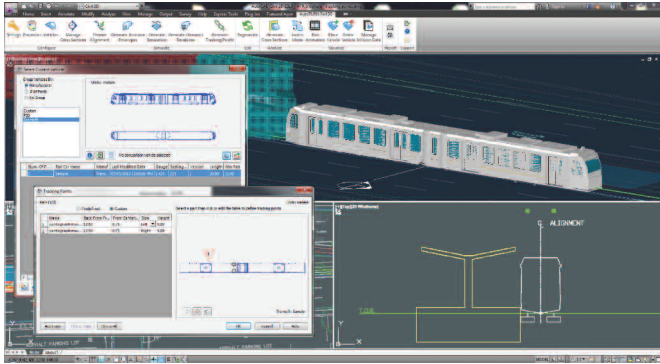
» CLEARANCE ENVELOPES

Quickly generate 2D/3D clearance envelopes that account for vehicle inswing/outswing, yaw, pitch and roll. Using the vehicle's static and dynamic envelopes allows the planner to check station platforms and check running clearance at curves simultaneously. Overlap 2D and 3D clearance envelopes anywhere along a vehicle simulation to comprehensively analyze clearances – the software allows you to check more in less time.



» Save time by making adjustments to the construction-maintenance tolerance and vehicle running clearance envelopes directly in the software.

APPLYING TECHNOLOGY TO ACCELERATE RAIL CLEARANCE ANALYSIS



USE VEHICLE TRACKING POINTS TO DESIGN OTHER FEATURES

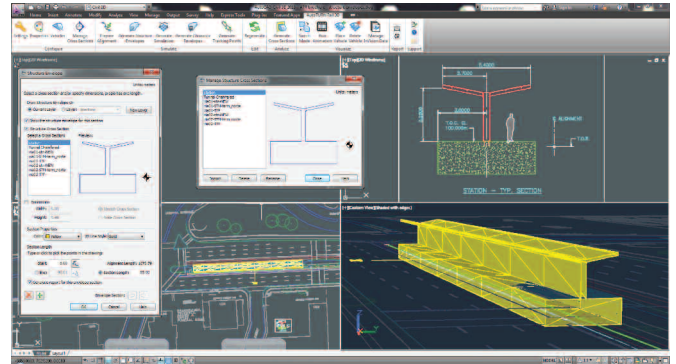
Tracking points on the vehicle can be specified to account for door centers, door sills, rearview mirror/camera housing, pantograph and station platforms. Once these points are swept along the vehicle path, they become 3D reference lines in space relative to the vehicle simulation. For example, designers can use a tracking point to design a suitable height of the station platform relative to the track alignment and height of the door sills.

« Tracking Point reference lines can be used to design the peripheral items of a rail alignment (e.g. station platforms, walkways, catenary systems, tunnel and retained sections).

MANAGE AND GENERATE STRUCTURE ENVELOPES

Import outlines of structural elements you have developed that occur along your design alignment and apply them along sections of the prepared alignment to create 3D structure envelopes. Structure envelopes can account for tunnels, trenches, retained sections, overpass, buildings, and station platforms. Increase the accuracy of the clearance analysis between the design vehicle and those peripheral structures by knowing exactly where refinements are needed.

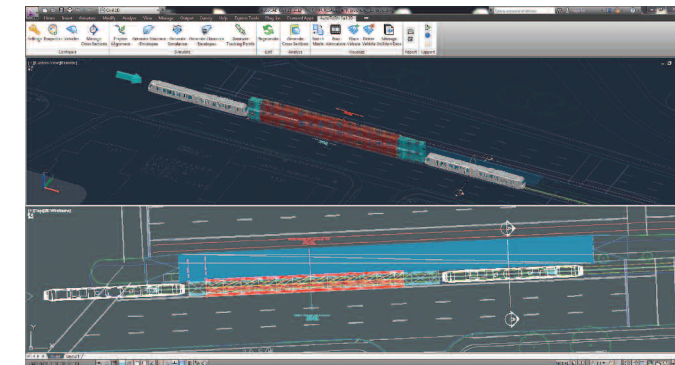
See how the design vehicle and its envelope(s) behave relative to adjacent structures » you apply (tunnel, trench and retained sections, overpasses, buildings).



SWITCH BETWEEN 2D AND 3D MODES

Whether by preference or for project requirements, AutoTURN RAIL allows you to work in either 2D or 3D modes. By converting the 3D simulations to 2D, the clearance envelopes are projected onto the 2D plane. This provides a more accurate 2D assessment especially when cant is applied.

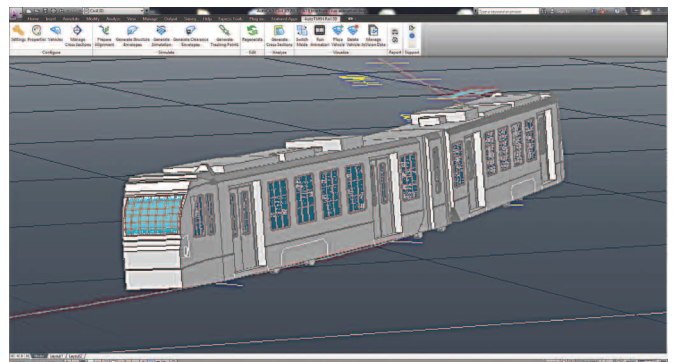
« Convert your analysis from 3D to 2D to produce your project deliverables but still be able to convert back to 3D to resume analysis



ANIMATE VEHICLE SIMULATIONS

Play an animation of your vehicle simulation to see the vehicle bend, tilt and twist as it moves along the alignment in "real time". Furthermore, exported InVision data that can then be sequenced and edited in Transoft Solutions' InVision product to produce video for consultation to better illustrate the design, or justify design concepts.

Clearly get the point across to non-technical clients and stakeholders via animation » of vehicle simulations showing clearance concerns.



» LIGHT RAIL VEHICLES

- Recreate a project design vehicle that reflects manufacturer specifications in the software through creating a custom vehicle
- Attach manufacturer's static and dynamic envelopes, and any user-defined vehicle envelopes (e.g. for maintenance and construction tolerances) to the vehicle - the software uses these to generate clearance envelopes
- Project Support Services are available for creating vehicles or libraries of vehicles

» INTERACT DIRECTLY WITH YOUR DRAWINGS USING PREPARE ALIGNMENT

- Horizontal alignment geometry can be an AutoCAD polyline composed of lines and arcs – user has the ability to set starting station.
- Vertical profile design can be an AutoCAD polyline composed of lines and arcs – user can set starting elevation
- CSV files containing cant/superelevation information can be read into the software which the vehicle simulation can react to
- The software can also recognize Civil 3D alignments (alignment horizontal geometry and vertical profile, cant/superelevation information must be read into software via CSV format)

» GENERATE 2D AND 3D VEHICLE SIMULATIONS

- Simulate design vehicle movement on a user-prepared alignment (horizontal, profile, and cant) in 2D and in 3D, sensitive to changes in elevation as well as cant/superelevation
- Use simplified parametric analytical models (a.k.a box models) representing light rail vehicles
- Ability to work with realistic 2D plan view and 3D photorealistic light rail vehicles

» GENERATE CROSS SECTIONS

- Generate a 2D sectional view for analyzing clearances at any point along the alignment or stationing
- Select required elements for display in a cross section to create a superimposed view to evaluate positioning
- Cross sectional view elements that can be shown include: static envelopes, dynamic envelopes, structure envelopes, vehicle inswing and outswing, key dimensioning, top of rail, and alignment centerline

» REPORTING FEATURES

- Generate angle reports that can be easily formatted to illustrate: yaw angle of the parts, truck/bogie angle relative to the part of the vehicle the user is reporting on
- A text file summary can also be generated for the angle report

» GENERATE TRACKING POINTS

- Vehicle tracking points represent various features beyond the vehicle body (i.e. pantograph, door center and sill, rear view mirror/camera housing) assisting in designing peripheral items along or adjacent to the rail alignment such as the catenary system, platform outline and elevation
- The software 'sweeps' the tracking point along the length of a vehicle simulation sensitive to any vertical profile and cant/superelevation information of a prepared alignment (just like a vehicle simulation) generating a tracking point reference line in space

» GENERATE VEHICLE CLEARANCE ENVELOPES

- Select envelope to be applied (Static, Dynamic, Clearance) for generating a 2D swept path or 3D swept volume
- Generated envelopes are sensitive to vertical profile as well as cant/superelevation information if entered when preparing the alignment and will reflect curvature and cant/super elevation effects

» VISUALIZATION CAPABILITIES

- Switch from 2D to 3D and back anytime
- Run Animation of a placed vehicle simulation to see its movement in real-time. If a simulation vehicle has a 2D realistic plan view drawing or 3D photo-realistic model, it can be made to show in the animation
- Generate InVision data from a placed vehicle simulation that can then be taken into InVision for video sequencing to produce project-related media

» CREATE STRUCTURE CROSS ENVELOPES

- The software takes the selected cross section and sweeps an outline for 2D or volume for 3D.

» COMES PRE-PACKAGED WITH TUTORIALS

- Built-in tutorials teach users how to use the software features in a structured, yet easy to follow manner.
- Step-by-step examples teach how to accomplish the following: Prepare Alignment, Generate Structure Envelopes, Generate Simulation, Generate Clearance Envelopes, Generate Tracking Points and Generate Cross Sections.

» COMPATIBILITY

- Autodesk® AutoCAD® 2010 – 2016 series of products (except AutoCAD LT®), Autodesk® AutoCAD® Civil 3D® 2010 – 2014 alignments
- Full support for 64-bit operating systems
- System requirements:
Workstation: Windows® XP, Vista, Windows® 7, Windows® 8
Network: Windows® Server 2000, 2003, 2008, 2012

ON TRACK FOR MORE ACCURATE DESIGNS

> SAFETY COMES FIRST – Railways are designed down to the millimeter and now AutoTURN RAIL can check engineering designs down to the millimeter. Conflicts can be eliminated before they become an issue.

> PLAN FOR THE FUTURE – In today's crowded cities, rail planners and engineers are responsible for putting as much track as possible into the smallest right-of-way possible. As railways become a more prevalent mode of transportation for goods and people, more infrastructure will be needed to handle this demand. AutoTURN RAIL will help planners create supply to meet the public's demands.

> ENGINEERING FIRST, ANIMATION SECOND – The Run Animation feature within AutoTURN RAIL allows the designers to see the vehicle's movement in real-time. Clearance issues or concerns with cant and superelevation can be seen as the simulated vehicles move through the programmed alignment.

> IMPROVE OPERATIONAL EFFICIENCIES – The functionality of the software allows engineers to check kilometers of track for conflicts or clearance issues in minutes, not months. Combining the 3D capabilities with the ability to use tracking points to create accurate cross sections means guesswork and manual calculations are a thing of the past.

TRIPS ON TRANSIT TREND HIGHER

Statistics released from the American Public Transportation Association show that 2012 ranks as the second-highest transit ridership year since 1957; only 2008 was higher. Trips in 2012 on U.S. subways, commuter trains, light rail, trolleys and buses beat the previous year by 1.5% or about 154.3 million rides. Compare these major US Cities:

- New York City MTA subways, up 1.82%
- Los Angeles MTA heavy rail, up 3.70%
- Chicago elevated trains, up 4.32%

HOW TO CONTACT US

NORTH AMERICA - HEAD OFFICE

1.888.244.8387 (Toll Free US and Canada only)

Telephone 1.604.244.8387

Fax 1.604.244.1770

info@transoftsolutions.com

LATIN AMERICA

Telephone 1.604.244.8387

Fax 1.604.244.1770

infoINT@transoftsolutions.com

EUROPE | MIDDLE EAST | AFRICA

NETHERLANDS OFFICE

Telephone +31 10 258 78 78

Fax +31 10 258 78 77

infoEU@transoftsolutions.com

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ASIA PACIFIC | AUSTRALIA | NEW ZEALAND

1.800.107.106 (Toll Free Australia only)

Telephone +61 2 9387 7115

Fax +61 2 8905 9574

infoAUS@transoftsolutions.com

0800 449 662 (New Zealand only)

infoNZ@transoftsolutions.com