HEADS Rail is CAD based Railway design software which processes Survey data obtained from Total Station which is processed to create DTM with Ground Contours. HEADS Rail also processes Satellite images, Conversion from TM (Survey) to UTM (GPS) Coordinates, Communication with Google Earth to plan for Green Field Alignments, processing of Ground elevation data by Online downloaded from Shuttle Radar Topography Mission (SRTM) from Internet by using Global Mapper without any field Topo Survey.

HEADS Rail designs Metro Rails elevated & Underground sections at straight & curved sections to suit the site situations.

HEADS Rail is highly advanced program which best processes Railway Track Design and Double Tracking jobs involving different design requirements along the route of the railway by proper processing Alignment Geometrics, Vertical Profile, Crossings and Yards.

HEADS Rail produces sophisticated Project Construction Drawings for Plan, Profile and Cross Section and Estimation of Earthwork etc.

HEADS Rail License is USB Dongle based, the Authorization code is generated upon receiving the payment for the Licensed version. The package contains the following items:

1. Installation Setup DVD
2. Users Manual, Design Manual, Tutorial Videos and Tutorials on real project data are in separate DVD.
3. USB Dongle,

For procuring HEADS Rail we request you to send your Order/Request with your address complete with Post Code and Telephone number to our email addresses as mentioned below. Next, we shall send you the Invoice for making the payment. Once the payment is received we shall send the package to you by express courier within next two working days, informing by mail with the courier details for Tracking.

We request you to contact us, in case you want to discuss on any point.

Techsoft Engineering Services (I) Pvt. Ltd.
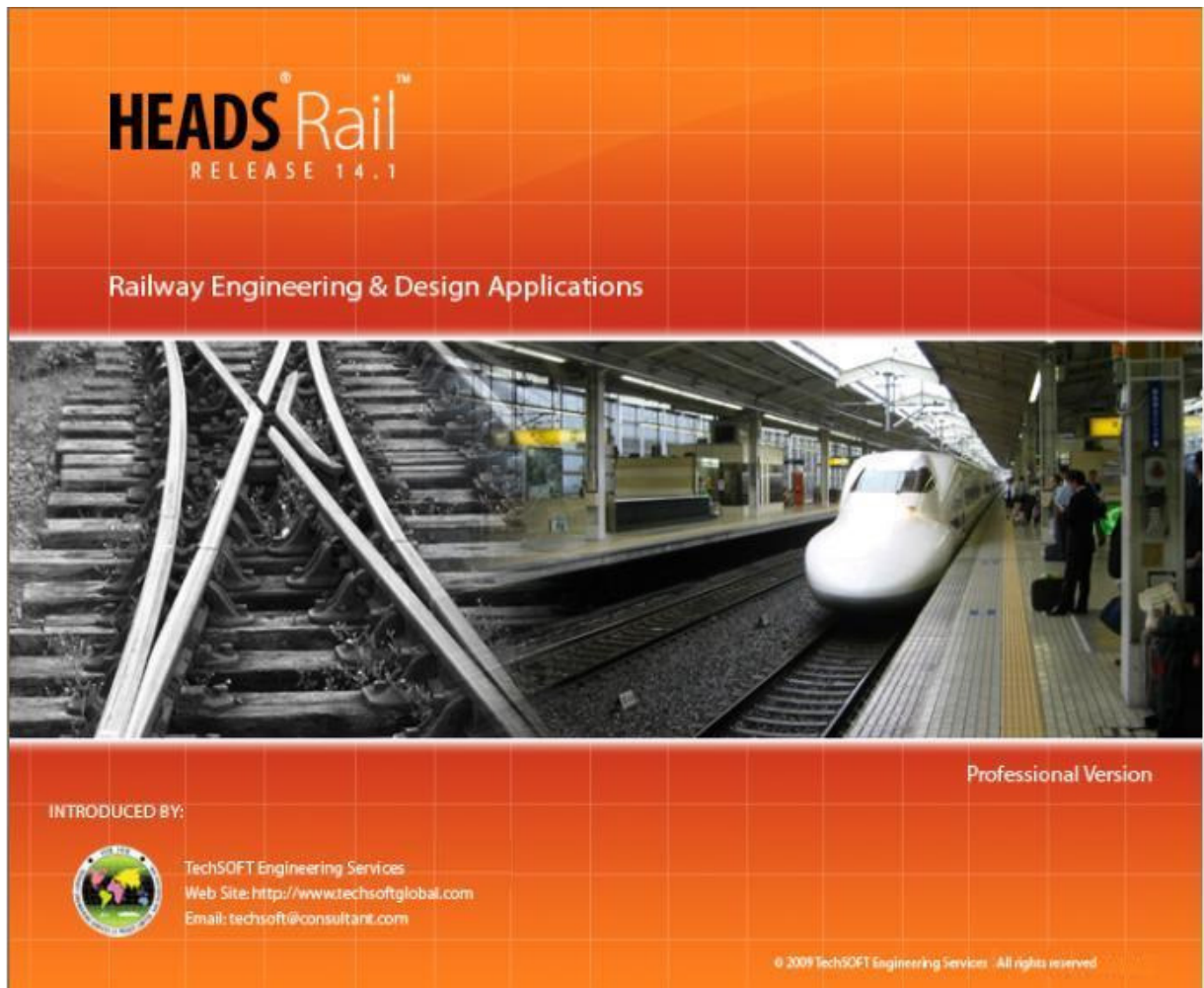Mobile/Cell: +91 9331 9330 39

Tel: +91 33 4008 3349, +91 33 2574 6314, +91 33 4603 6129
Email: techsoft@consultant.com , dataflow@mail.com , techsoftinfra@gmail.com
Web site: www.techsoftglobal.com

HEADS Rail®

The largest and versatile software for Railway, Metro Rail, LRT, MRT, Mono Rail Engineering projects

[Operating Systems: Microsoft Windows XP/Win7 32 / 64 Bit, Minimum 2 GB RAM, 100 GB HD Space]

TechSOFT Engineering Services

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Tel: +91 33 4008 3349, +91 33 2574 6314, +91 33 4603 6129

Application of Railway Design software HEADS Rail in developing effective Railway Transport System

The development of effective rail transport system is the primary need of any developing country and the upgrading of existing railway network system is essential for the developed countries as the capacities of railways are reached to saturation level with the passage of time.

The railway development involves very high degree of attention by the project Authorities as well as by the Consultants, Engineers and Contractors. Any mistake May result in expenditure of a few millions which could have been avoided. Normally the design of route alignment and the ancillary structures decide the cost of a railway project and for this job the best experienced manpower and best available tools must be deployed.

The best available tools essentially Include the selection of most appropriate Railway Design software which must be capable of handling any type of situation and the best manpower is the engineers and other technical staff who have the essential educational background and sufficient experience in working for similar projects and most essentially have required level of training to use high quality design software products.

HEADS Rail is applicable for Metro Railways for design speed of 135 Kilometres per Hour or more, Standard gauge, Broad Gauge, Meter gauge, any defined maximum "Cant" at Super elevated sections giving inner edge rotation, Curves with Clothoid Transitions, Earthwork Estimation, Construction Drawings, Design of rail Yards, Design of Points, Crossings, Track Diversion in case of Repairing, Curvature, Train Resistance & Haulage Capacity on Grades and Track stresses.

NEXT GENERATION TECHNOLOGY

Presently there are two varieties of Software available based on two basic concepts namely: "Template" and "String" modeling. The first group of products are simple to learn and handle but have substantial limitations in handling today's demand for railway geometric design, Whereas software using "String" modeling technique is efficient for railway projects involving Cost Control for new rail routes, double tracking of existing routes, Surface Correction & Strengthening, Design of multi-alignment railway junctions, points, crossings, yards, varying cross-sections, with or without service corridors appearing anywhere along the length, design of Underground Metro Rails, Elevated Metro Rails, Mono Rails, Hill routes having special considerations, Railway Tunnels with sharp turns ranging from 90 to 180 degrees. In HEADS Rail the conventional String technique is modified to make the production more efficient. HEADS Rail has full power CAD engine to view and edit drawings as desired. The drawings are compatible to all commonly used CAD softwares.

It is simple in HEADS Rail to transform the Surveyors coordinates into Global UTM / GPS Coordinates using in-built CAD engine, next the transformed drawing may be opened for conversion to KML/KMZ file to open in Google Earth to plan for Green Field alignments, Bypasses and Realignments as larger area with existing Land use are visible. Even the Original Ground Elevations along with Easting & Northing Coordinates are available from the satellite images without doing the topographic survey at the field.
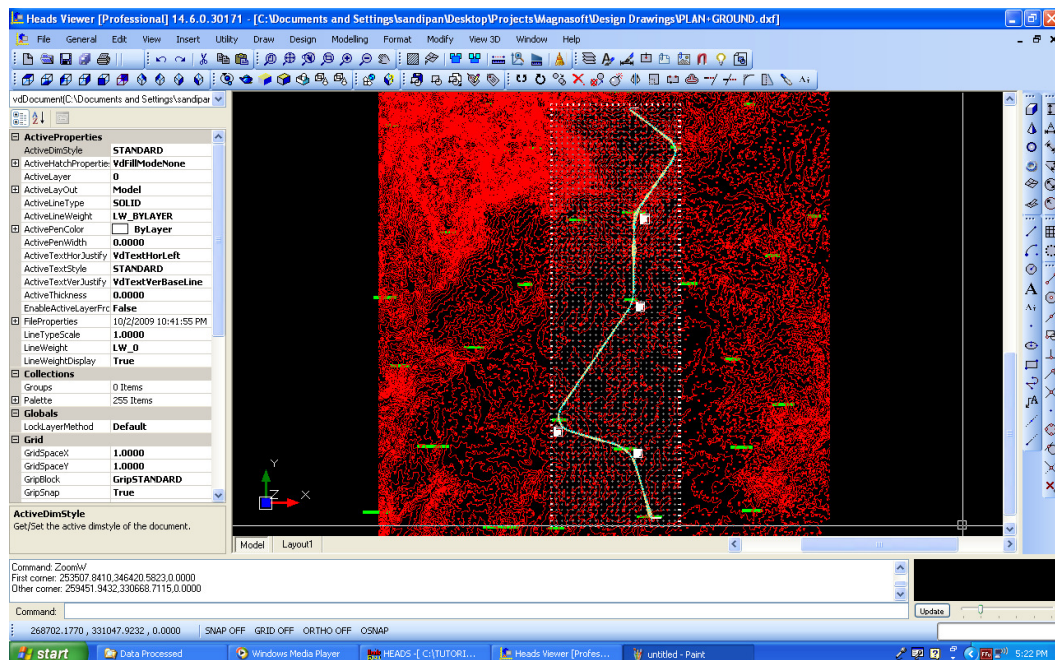

Fig 1   Power of CAD based design technology

HEADS Rail software from TechSOFT Engineering Services is based on "String" modeling technique and is today's established name in offering the users all the facilities described above. It accepts Topographical Survey data from Total Station, Auto level, GPS, Topo Maps, Aerial Photograph, Satellite Imagery Remote Sensing etc. It offers the facility to use Digitized Topo Maps in case of absence of Topographical Survey data. Detailed tables are also generated for Traverse Survey, EDM Survey and Co-ordinate conversion from Spherical (Lat-Long) to Rectangular (Easting-Northing) which is a very complex process and is hardly available in market available products. HEADS Rail has its own CAD engine and is best appreciated for its Power, Completeness, Versatility, Fastest Processing, Simplicity and Exchangeability of Input and Output with other commonly used Railway Engineering software of similar kind and all popular CAD software.

HEADS Rail itself is a marvel in the history of railway engineering softwares. The main power of HEADS Rail lies in its CAD engine which produces sophisticated construction drawings for the project. This achievement is in addition to its engineering output with best possible accuracy and widest range of coverage in any Railway engineering project.

Salient Features cum Technical Specifications:

Applications for Land Survey , DTM and GPS:

- Processing of Total station Survey data,
- Development of Ground Modeling,
- Digital Terrain Model, Digital Mapping, producing Survey Base Plan,
- Ground Long and Cross Sections,
- Contouring, Perspective views,
- Traverse Co-ordinates correction by Bowditch, Transit, Closed Link, EDM Applications,
- GPS Survey and Co ordinate Transformations,
- Storage of Ground information in Layered CAD System compatible to AutoCAD, MicroStation etc.,
- In-built CAD graphics and design system is very sophisticated and full of drawing features

String based software generally starts functioning using the Detail Survey data primarily using Total Station instrument. But there are a lot more tasks to do in an actual project, before obtaining the Detail Survey data. These essential tasks are most commonly the Obtaining two Reference points at every 5 Kilometres using GPS instrument, Using the GPS Co-ordinates carrying out Traverse Survey by using Total Station instrument, Obtaining Correct Traverse Co-ordinates by Bowditch or Transit or Closed Link method followed by installation of Reference Pillars to help in carrying out the Detail Survey. These are essential tasks for any Detail Survey project. The GPS data is more reliable if obtained in the form of Longitude and Latitude (than in the form of East North), the Long Lat data may be converted to Easting and Northing by using correct parameters specific to the location in the globe. Once the GPS data are available in Easting and Northing, these become usable by the Total Station instrument. The data conversion needs correct parameters and the process is also quite cumbersome. Additionally the Correction of Traverse Co-ordinates to install Reference Pillars also needs considerable amount of time and effort by the engineers at the project site. Here comes HEADS Rail has the complete one stop solution for all these requirements by the site engineers at simplest effort. Being a String based software HEADS Rail is very versatile to handle various site situations and eventually comes as an 'All Complete Solution' for various Railway Engineering projects.

Applications for Engineering Design :

- Alignment design for Railways, Metro Rail Tunnels, Mono Rails, MRT, LRT etc.
- Processing Geometric design with complete set of site setting-out information
- Producing best formatted construction drawings for PLAN, PROFILE, Cross Sections
- Produces Estimation of Quantities,
- Analysis of Item Unit Rates,
- Hydrological design of Drainage,
- Under ground Metro Railways with generation of Coach profiles at turnings etc.
- Elevated Metro Railways
- Detailed and well formatted Design Reports and Drawings.

Applications for Construction:

- Processing Cross Sections Survey by Auto Level,
- Bill of Quantities for Running Account Billing
- Chainage wise Cross Section Drawings,
- Generating Site Setting out details with desired modifications as and when required,
- Preparation of As built Drawings
- Alignment Control for Tunnel Boring Machine (TBM),

Special Points on Technical Specifications

- Co-ordinate Conversion to exchange data between GPS & Total Station.
- Traverse Survey with String Modeling and closing error distribution.
- Contouring with user defined intervals and display of Elevations.
- DTM is accurate & can take up to 300,000 points.
- Model Strings may take up to 20,000 Strings.
- Conceptualization of Route Alignment on Aerial Photograph / Satellite Imagery.
- Co-ordinate transformation from Long-Lat to East-North and the reverse
- Design of Points, Crossings, Yards etc.
- Design and estimating of routes with "No Land Acquisition" criterion
- Optimized vertical profile design for Exact Quantity of Earthwork at desired Haulage capacity.
- Auto level survey for Cross Sections and Bill of Quantities.
- Extended ground in Cross Section drawing to show full Survey Corridor.
- Built-in CAD engine for viewing and editing drawings compatible to AutoCAD.
- DXF Plan, Profile & Cross Section Drawings compatible to all CAD software.
- Long Section Drawing with Alignment & Super Elevation /CANT details, even in Pieces.
- Plan drawings in sheet wise pieces by Sheet Layout.
- Interactive design for a large alignment length in one go (in True Sense).
- Control on Shifting of Alignment for Tunnel Centre Line.
- Design interchangeability with other popular design software.
- 3D perspective view from various angles
- Exporting LANDXML data for "Drive Through" Simulation by UC winRoad.
- Straight forward interactive design for Main Alignment, Loops.
- Irregular occurrence of Service corridors on either side and change of cross section.

Survey facilities with latest technologies by using GPS Technology are best processed in HEADS Rail

The instrument GPS (Global Positioning System) is based on Satellite technology. If the Survey is done in Surveyors TM Coordinates the data and Survey base Plan may be created in TM Coordinates, which are not applicable universally by any user, for example Contractor. So the Drawing & Data available in TM Coordinates are to be converted to UTM (Universal Transverse Marcator) Coordinates. Both the conversions (Drawing & Data) are possible in HEADS range of products to make KML / KMZ files which may be superimposed on Google Satellite images (Version 2010) to view the existing Land use and Merits/Demerits of each alignment options.

It is simple in HEADS Rail to transform the Surveyors coordinates into Global UTM / GPS Coordinates using in-built CAD engine, next the transformed drawing may be opened for conversion to KML/KMZ file to open in Google Earth to plan for Site Layout, Green Field alignments, Bypasses and Realignments as larger area with existing Land use are visible. Even the Original Ground Elevations along with Easting & Northing Coordinates are available from the satellite images without doing the topographic survey at the field.

Digital Terrain Model & Contouring: The area may be identified by site reconnaissance survey and using Topographic maps and satellite imageries. Elevation data may be downloaded from SRTM (Shuttle Radar Topography Mission) and contours have been generated for the entire area under the study. This enables the users to produce Plan, Profile, Cross Section Drawings and BoQ of the design work without carrying out Topographical Survey at field.
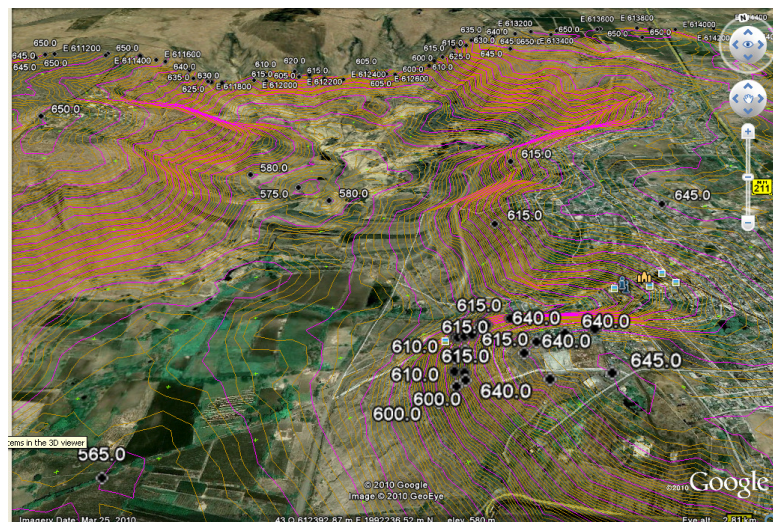
Survey work with advanced instruments & Techniques are best processed in HEADS Rail

It processes Survey data available from Total Station, Auto Level, GPS, Compass Survey and develops Ground Model, Digital Terrain Model (DTM) by Delauny Triangulation, Ground Contours, Ground Sections at user given primary & secondary intervals, 3D Surface with rendering, Ground Long and Cross Sections, Digital Mapping. The Digital mapping facility enables the users to prepare Survey base Plan drawings over Google Pictures using the CAD engine of HEADS Rail.

The Survey reference pillars can be installed by obtaining Traverse coordinates with closing error correction by Bowditch, Transit & Close Link methods, EDM Survey, Coordinate Transformation from WGS84 to Lambert Conformal Conic Projection (Long Lat to East North) and the reverse with Spheroid Everest 1956. For any Site preparation, the existing ground is compared with the Proposed Leveled Ground and the Earthwork is estimated in terms of Cut & Fill. The Triangulation is done with best possible accuracy, using spatial data, developing DTM, drawing Contour Topography, Digital Maps and establishing Area / Zone wise reference points to facilitate various construction activities in the future

Satellite Images or Aerial Photographs for various regional planning and design **m**ay be used efficiently for on screen interactive design over these images and is considered as most advanced facility by the use of latest technology.
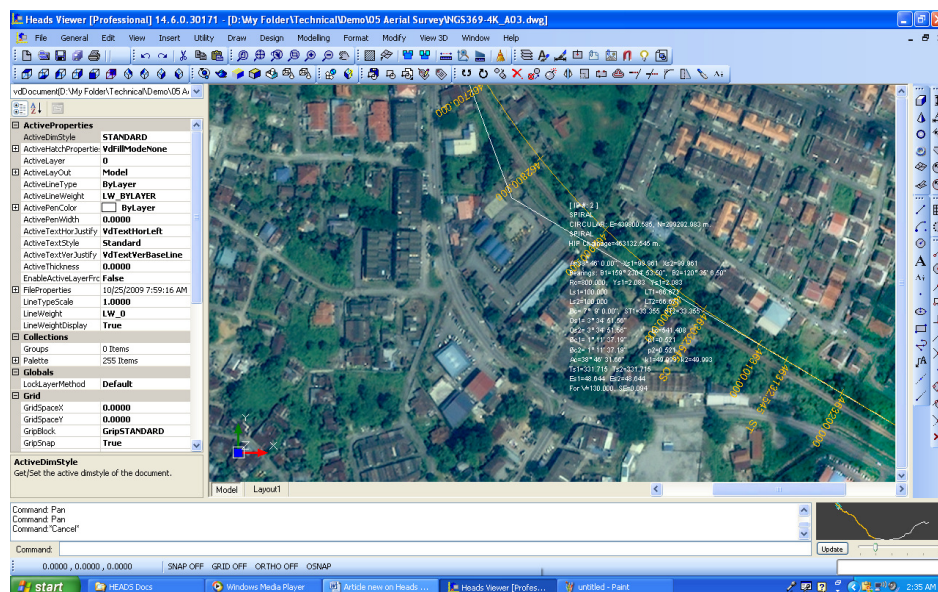
SURVEY BASE PLAN or GROUND MODEL is prepared from the Total Station Survey Text data and by selecting drawing feature symbols from CAD Block library, the various texts obtained from the surveyors are also placed correctly in the Base Plan drawing. The drawing is made in CAD layered system and is compatible to AutoCAD and other popular CAD softwares for any further editing/drafting. Contours and DTM, with Ground sections are also produced as Reports and CAD drawings for Plan & Profile, Cross sections. This saves the time significantly in preparation for the Detail Engineering Projects.

Built-in CAD System of HEADS Rail provides most useful and effective facility for various design work in modern Railway/Metro Rail Transit Projects. The availability of Google images is a remarkable achievement in recent time. HEADS opens the images and upon setting actual Easting & Northing coordinates in the image the route alignment may be tried for various options against the existing land use of the region and finalized for best techno-economic option.
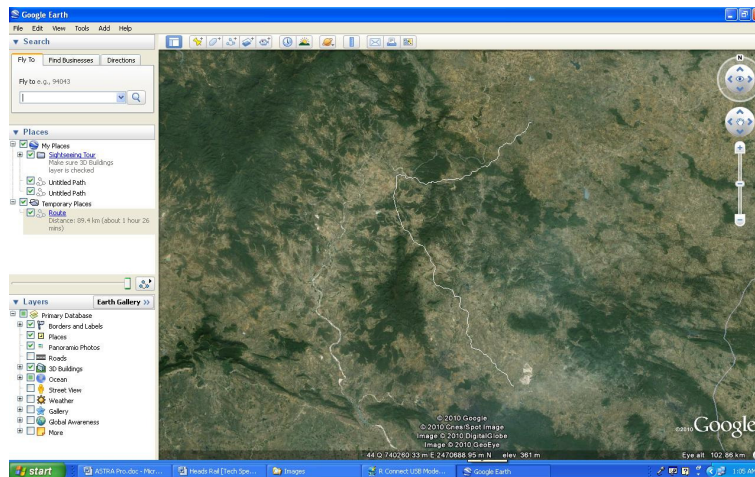
CAD based interactive Alignment Planning on Satellite or Google Images

## IN BUILT CAD ENGINE FOR INTERACTIVE DESIGN AND DRAWINGS

HEADS Pro is the masterpiece for its various applications in railway engineering projects. It enables the engineers and professionals to produce the best in their work by suiting the site condition most accurately and economically.
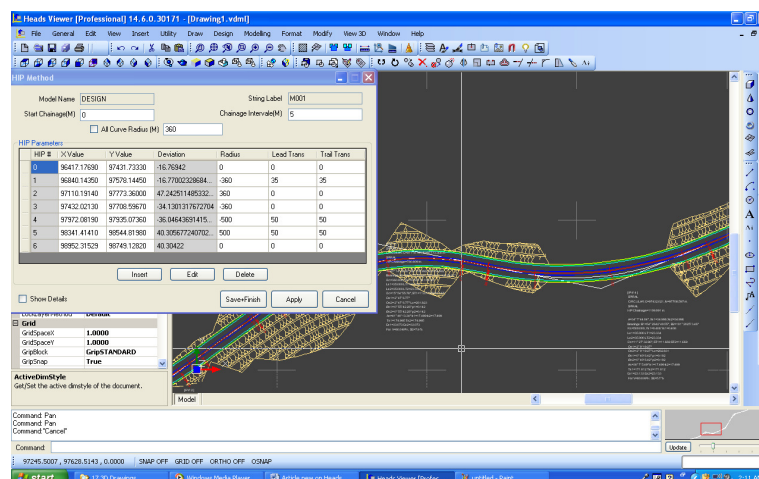
CAD based interactive alignment design and modification at any time

## DESIGN OPTIMIZATION FOR COST MINIMIZATION

Advanced technology is available in HEADS Rail to Optimize the Vertical Profile of the proposed railway for the Earthwork in Cut & Fill in case of new construction or double tracking projects.
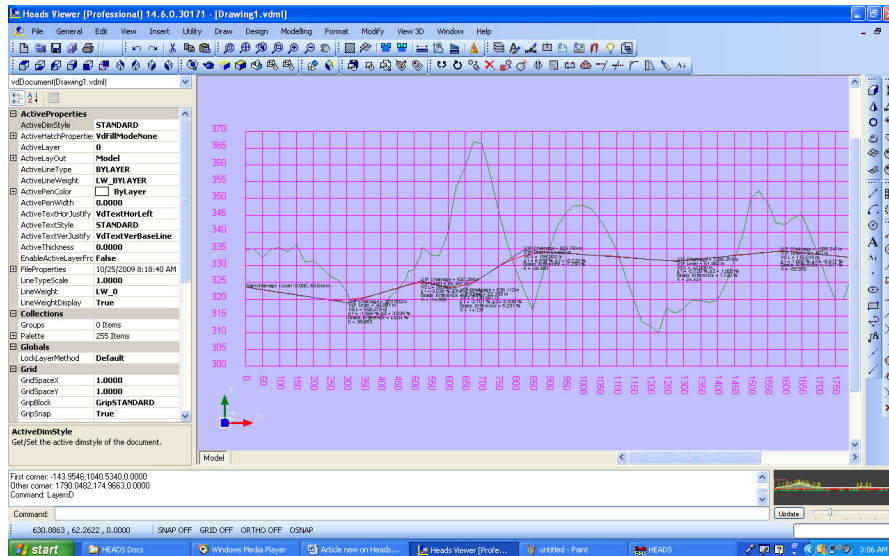

Design Optimization for Cost Minimization

DESIGN OPTIMIZATION DECRIBED IN PROFILE LONG SECTION DRAWING

Facility is available in HEADS Rail to design Vertical Profile based on the calculated Haulage Capacity and Grades of the proposed railway for the Earthwork in Cut & Fill based on available Haulage capacity.
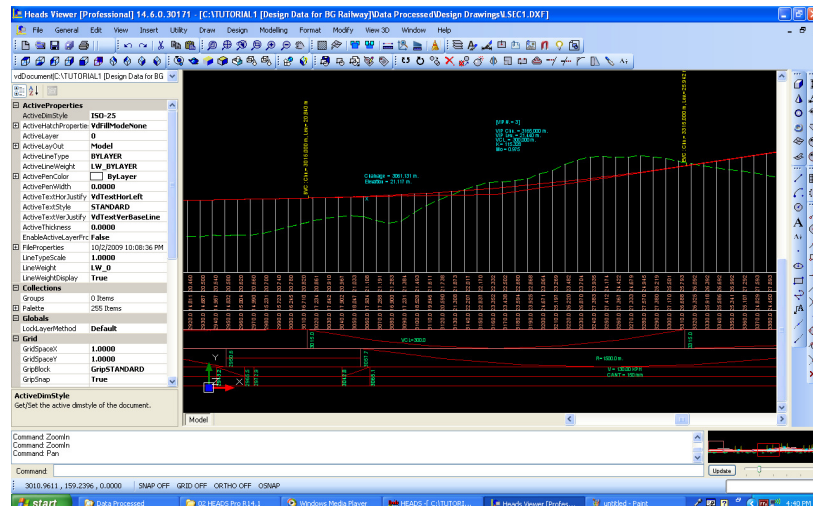
Optimized Vertical Profile in Long Section Drawing

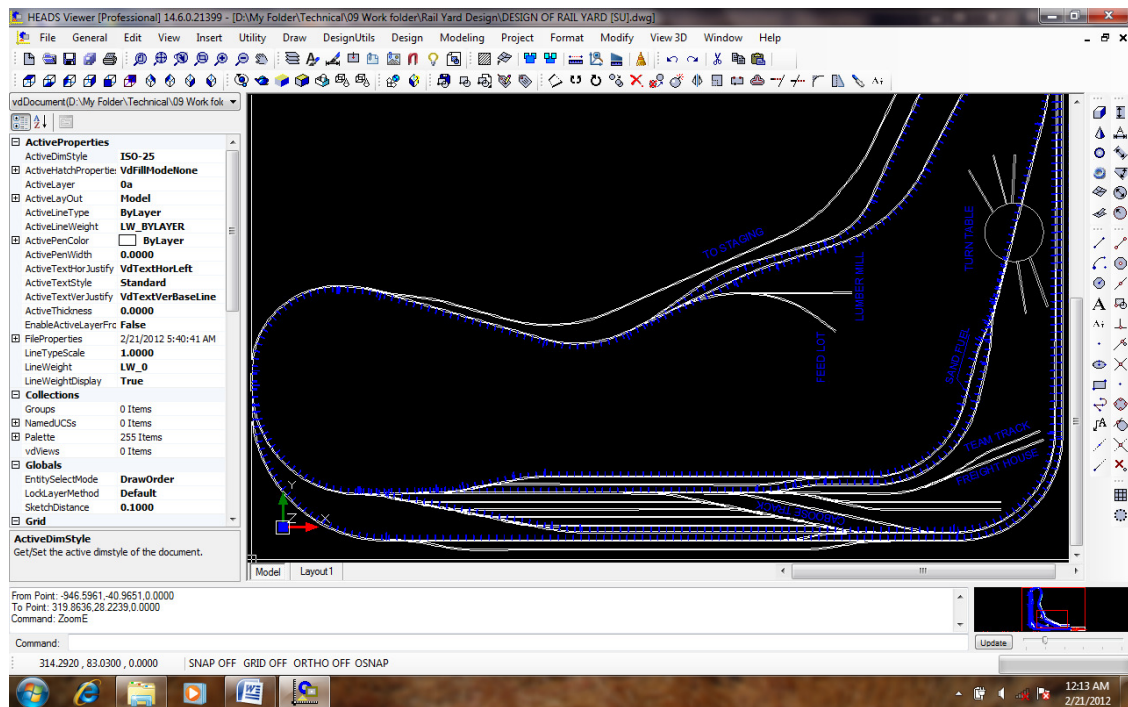## CONSTRUCTION DRAWINGS FOR RAILWAYS
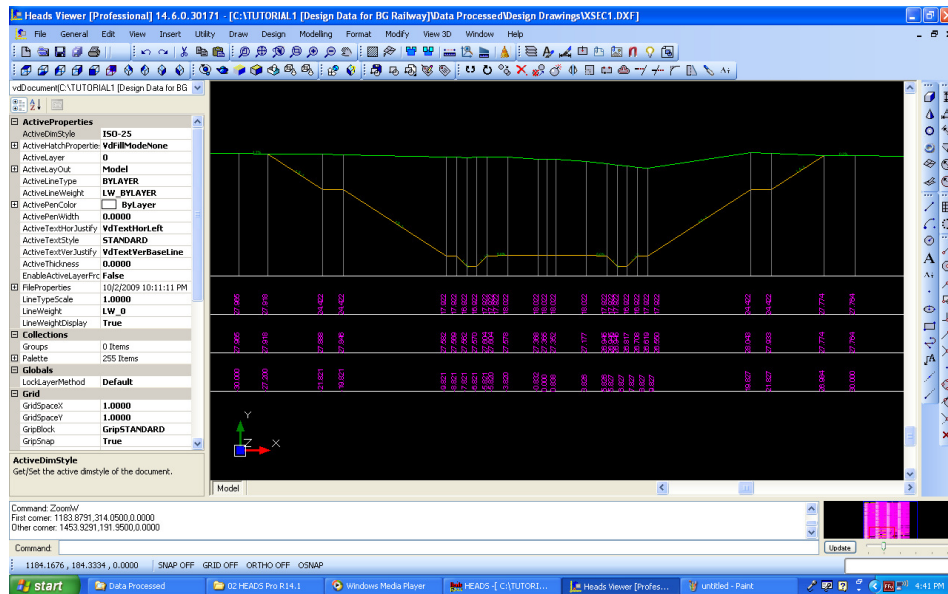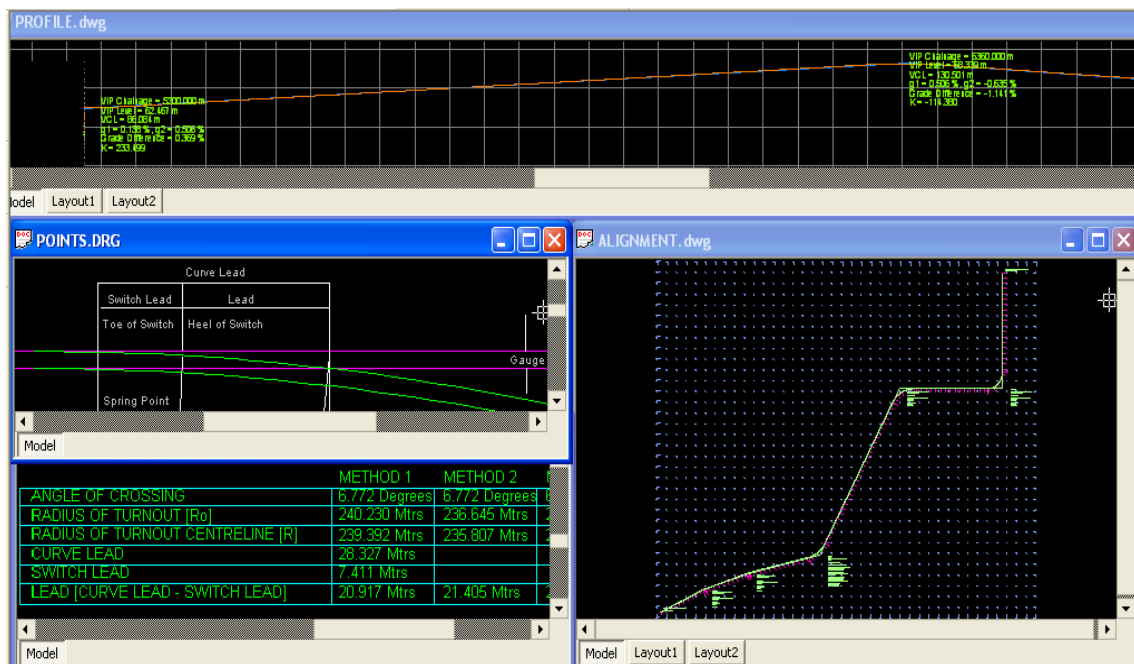

Cross section Drawing in CUT
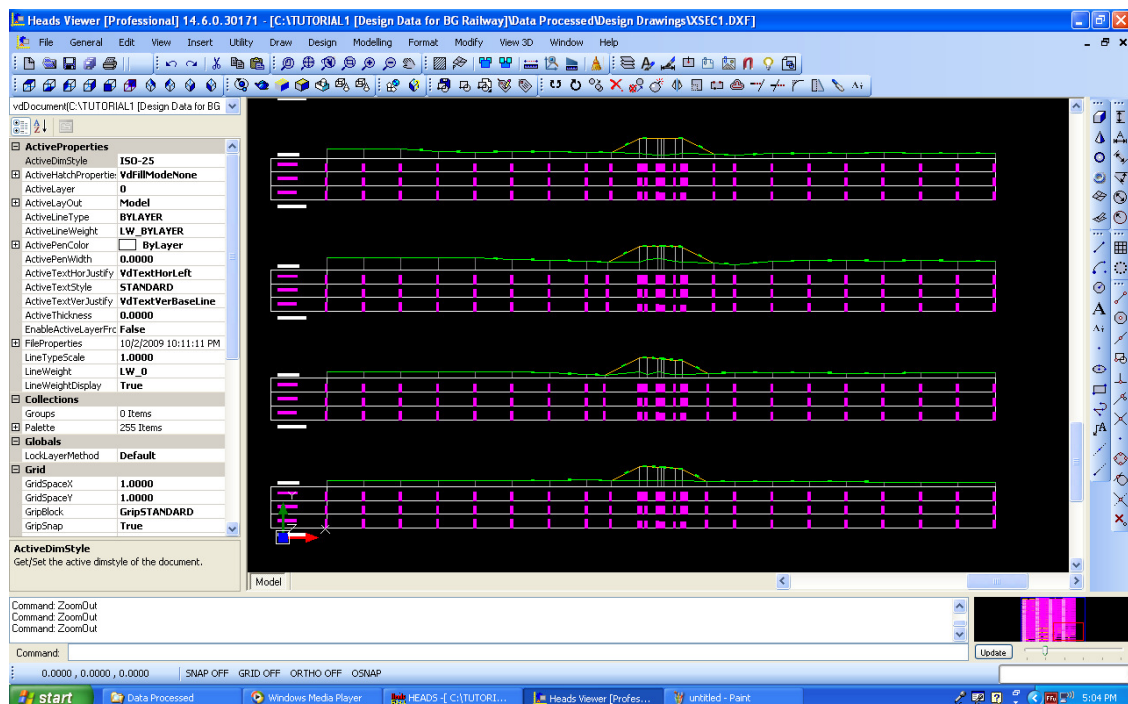
Cross section Drawing in FILL

DESIGN OF Rail YARDS of types Diamond, Pyramid etc.

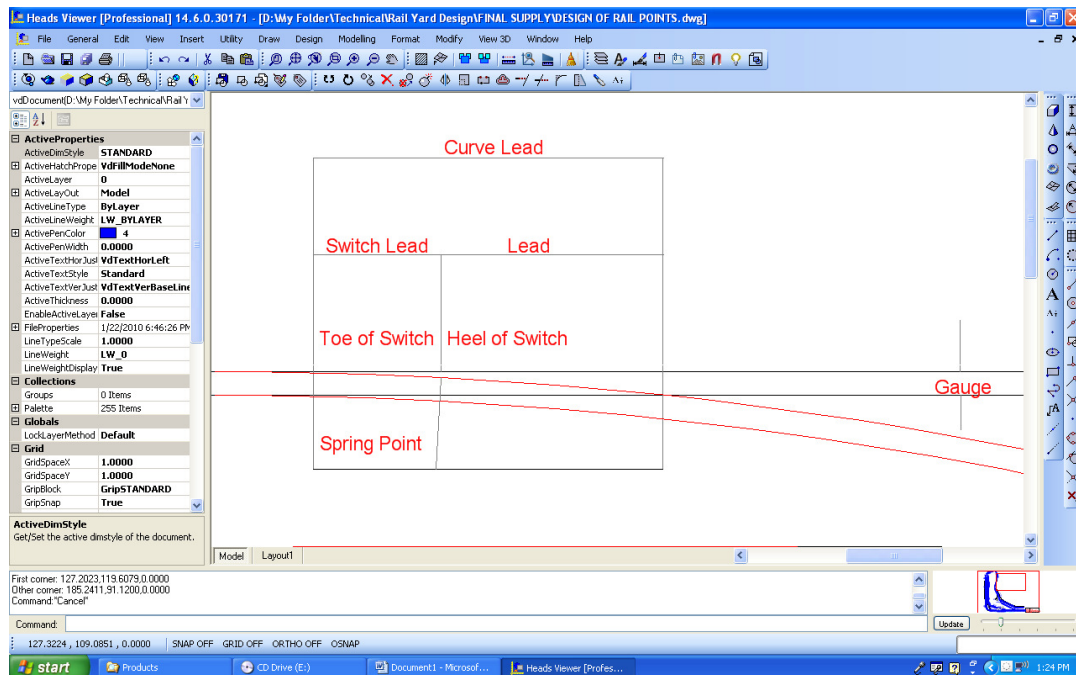**Diamond Type of Rail Yard [1]**

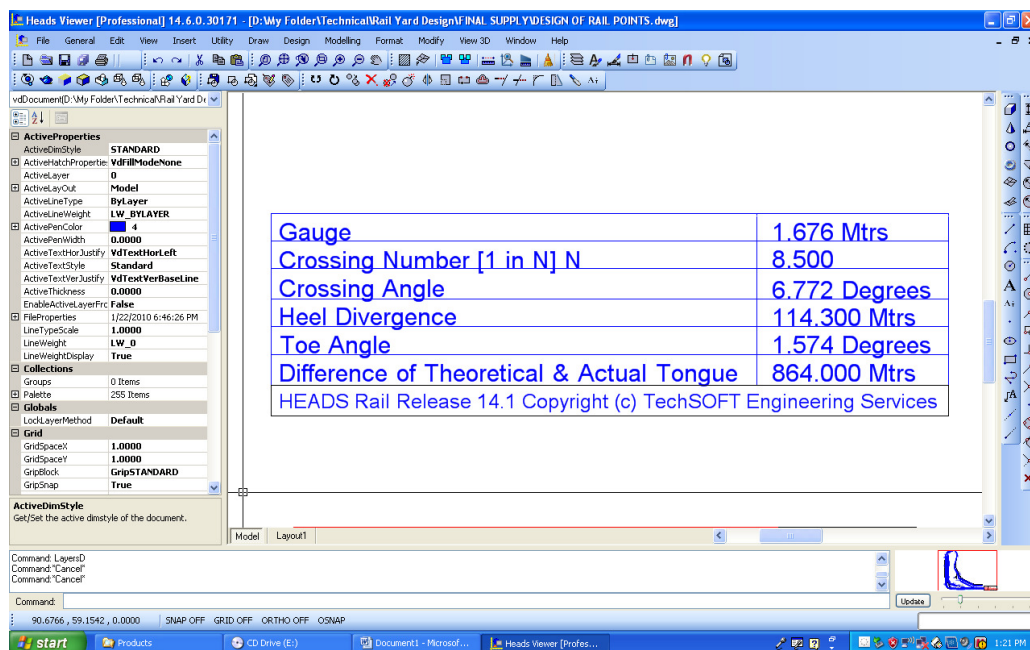**Design of Alignment, Profile, Switch details etc. For Mono Rail**

Design of Mono Rail

DESIGN OF POINTS and CROSSINGS

Design of POINTS


Various design elements in POINTS

Design of Alignment, Profile and other features for Elevated sections of Metro Rail

Design of Elevated sections Metro Rail

Design of Alignment, Profile and other features for Tunnel sections of Metro Rail

HEADS is the ideal solution for the engineering design and construction of vehicular and Railway Tunnels either Bored or Cut & Cover type
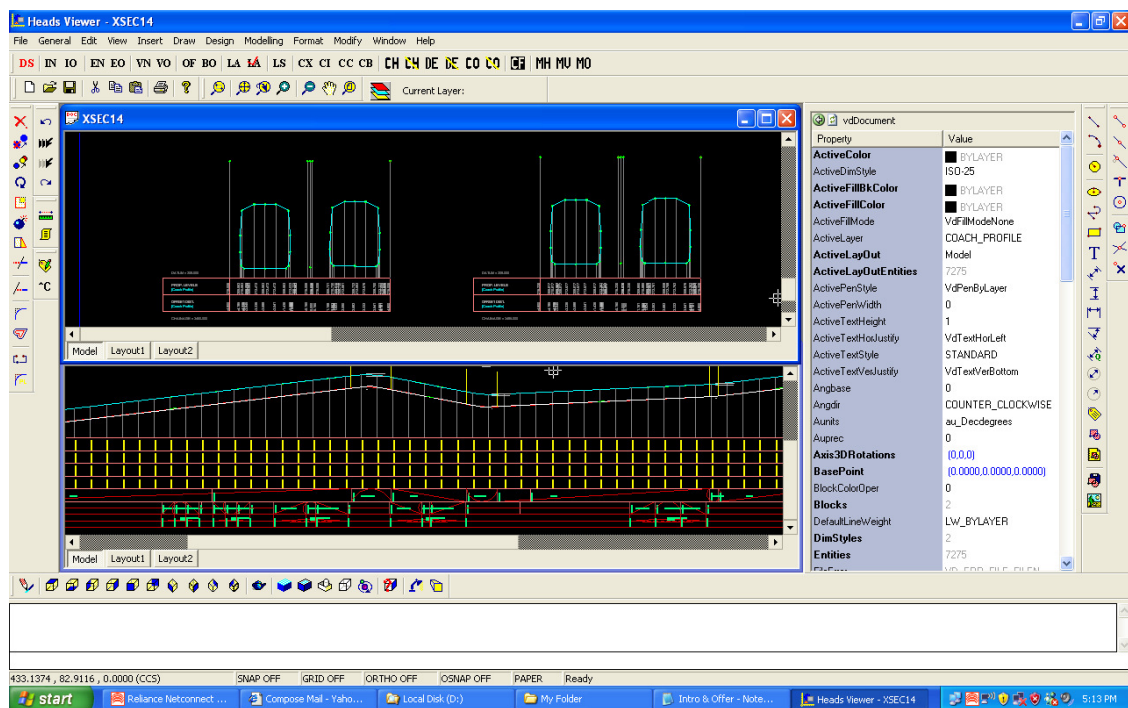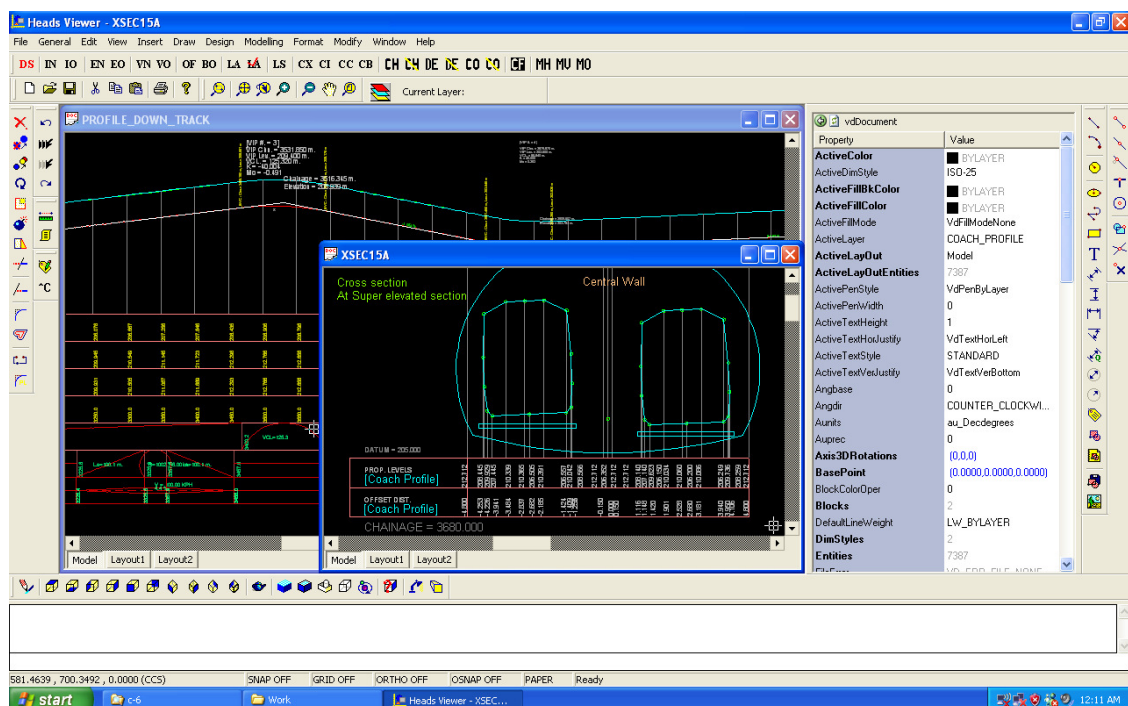

Design of Tunnels for Metro Rails

TUNNEL CONSTRUCTION: The design Audit is extremely important during the Tunnel construction. Any deviation of the Tunnel axis from the original alignment must be rectified as soon as it is detected. For an early detection appropriate instrumentation is essential.

Other than the Tunnel axis the measurement of deviation may also be essential for other relevant points in the cross section. The comparison is done by using the original design alignments through those points. So the original design must be available for alignments through those points.

In normal straight sections and in curved sections it is essential to generate alignment with shifts in horizontal & vertical directions at various locations and elevations. Because of the super elevation calculated from the curve radius and design speed, the tilt is more at greater height & distance. This may lead to reduction of the lateral clearance between the coach top edges and the side walls of the Tunnel. The deviations by TBM at any station are numerous, the final shell alignment is fixed by Curve fitting mentioning limits along both the axes.

HEADS creates such most essential Tunnel cross section drawings taking points at various offset distances and elevations in the cross section to create the dynamic coach profiles and make the audit possible in true sense. In Tunnel engineering HEADS is the most essential software to produce engineering reports and drawings with most of the information required and with best sophistication.

Coach Profile for Construction of Tunnels for Metro Rails

HEADS Rail

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