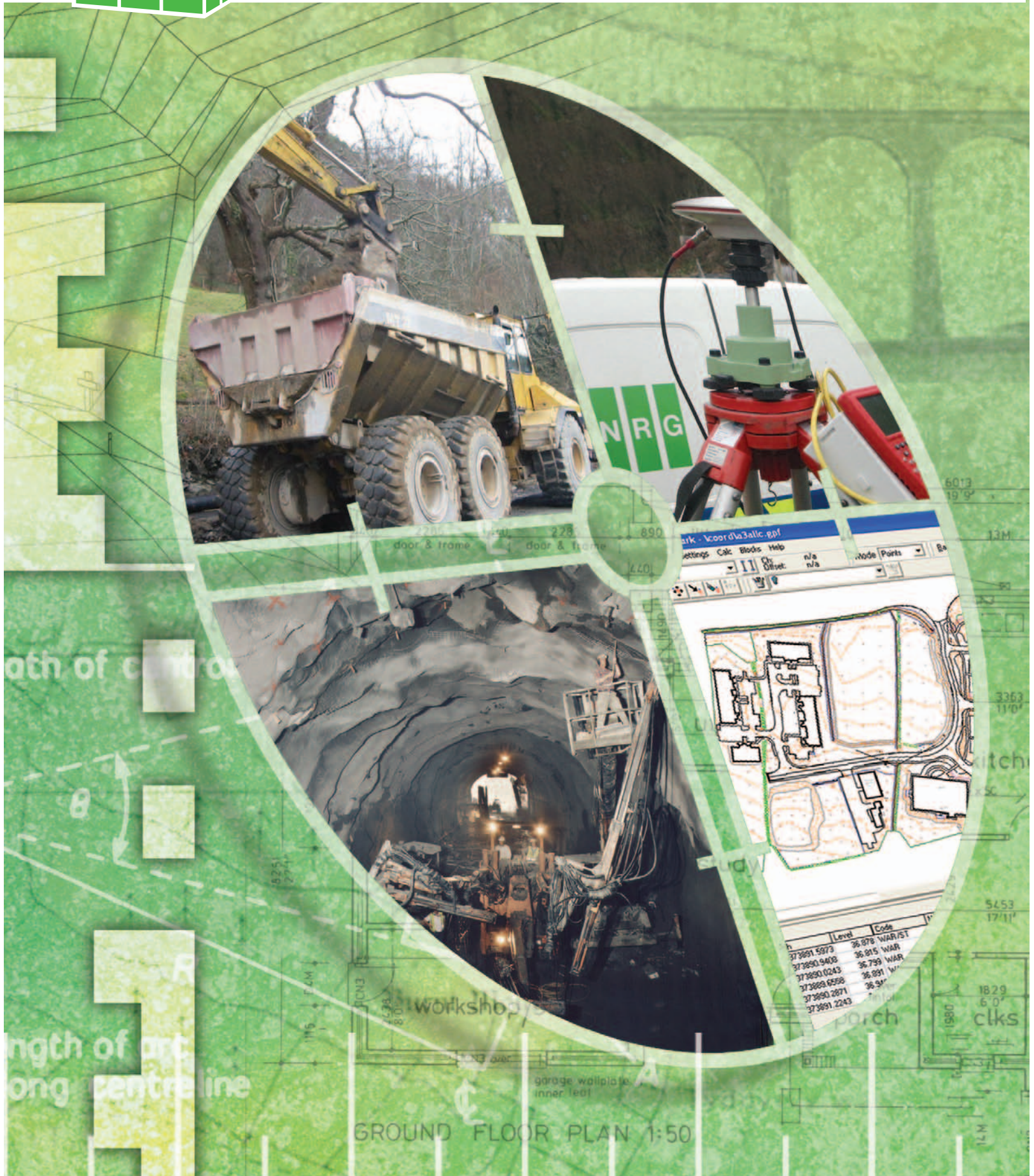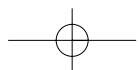# *Geospatial Engineering Software*

NRG

Practical Solutions to Technical Problems

NRG Geospatial Engineering Software

NRG is a Software System that has been developing since 1984. It is a system born of the needs of, and developed by, practising Engineering Surveyors. It has grown to encompass most of the day-to-day tasks of Construction. Its primary function is to aid Contractors to build a Project, and get paid for doing so

We are proud to have been involved in many hundreds of miles of new road Construction; Tunnels; Railways; House Building; Portal Frame Building; Airports and Pipelines. Our customers are Estimators; Quantity Surveyors; Land Surveyors and Engineers. So if you are one of these professionals, then there's something in this brochure that will make your job easier, and, just as importantly, your company more profitable.

NRG Software is broken down into modules and can be purchased as 'packs' or by selecting modules to meet individual needs. Support and Training are important aspects of specialist Software such as this so we pride ourselves on the high level of expertise we can offer to all of our Users. We have a large team of Engineering Surveyors, who have spent considerable time using the software in the field and are available to assist with their experience and knowledge.
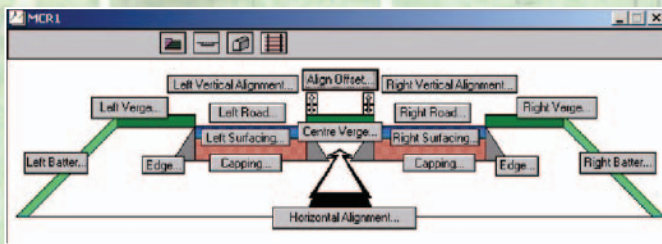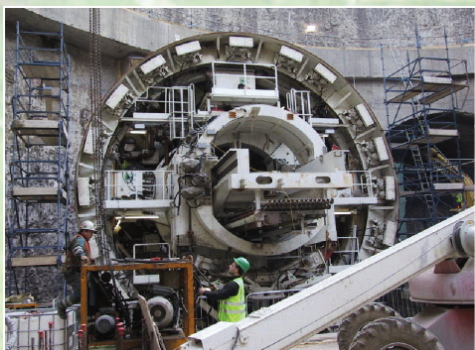
Geospatial Engineering Software
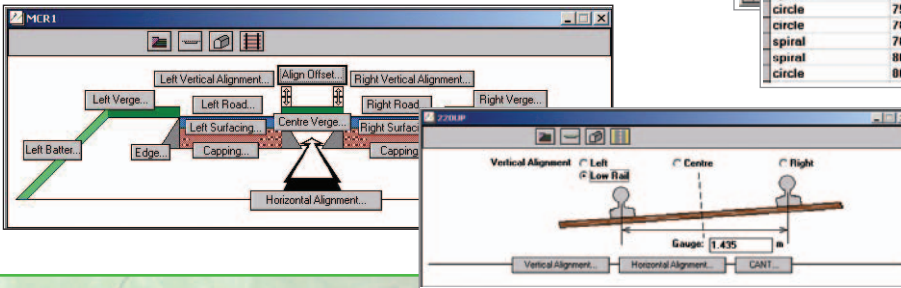
Contents

Contents

Road / Rail Design

Horizontal / Vertical Alignments

Roads / Railways

Road and Rail Alignments can be entered in the same way. Horizontal elements that are Straight, Curved or Splined are supported by NRG Software.

Vertical Alignments support Straight and Parabolic curves.

Road Templates

Road Templates can be entered manually or extracted from digital information. Having extracted a Horizontal and Vertical Alignment, widths and crossfalls can be attached to create a complete Road Design; incorporating multiple Falls across the carriageway and Batters if required. The Road Template is created through a process of assigning Strings to a Design element pictorially.

The Road Template holds information relating to the carriageway edges, verges and batters. At any point on the Design the NRG Software System is aware of the Inner and Outer carriageway edges. This allows the User to import an Offset from any element of the Design. Levels for each element of the Crossfall can be extrapolated to the Offset position.
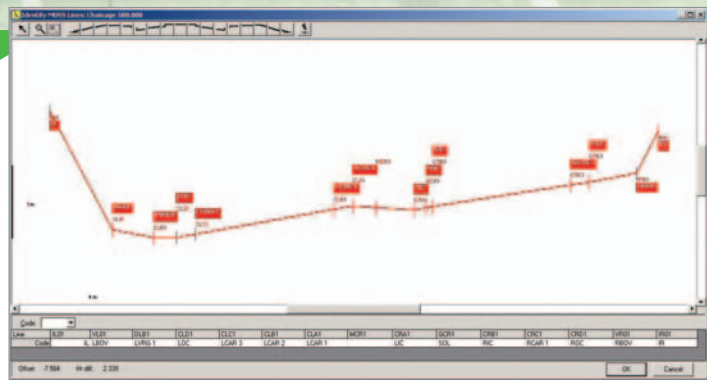
Once you have created a Road Model in this manner, the Setting Out module can access the information and produce Batter Rail, Profile and Road Pin Schedules; Surveyed Points can be related back to the Design – ideal for calculating 'u head' Levels on Bird Cage Falsework or checking As Built structures. It is also an indispensable tool in the QA System for Setting Out. Cross Sections can be generated for Volume Calculations or Viewing.

Surfacing

Surfacing and Capping depths can be attached to the Alignment.
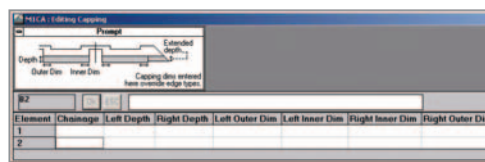
Edge Details

A customisable library of edge details enables NRG Software to develop an accurate 'Earthworks Measure' for detailed Measure.
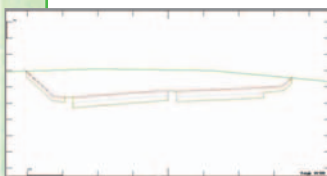
The User assigns edge details to Chainages, so that a true earthworks outline can be created at any Chainage.

Volumes and Areas are calculated for all of the measurement items.

Geospatial Engineering Software

Setting Out / Dimensional Control

NRG Software is an essential aid to Road and Rail Construction.
New Build and Re-Build; Road Overlays and Track Relaying are all
in a day's work for our Setting Out utilities.

Import Data - MX, DXF, CSV etc.

Data can be imported from a variety of sources, with the major file formats supported by NRG. A number of Import, Export routines are provided to enable seamless transitions from other software packages. AutoCad Dxf, MX Genio, Leica Gsi, MX

Models and PanTerra Exit files are amongst those supported. The User can overlay a scanned image as a coordinated, scaled and rotated background. The scanned image can be used to take off coordinates for Setting Out.

Calculating XYZ from Chainage & Offset

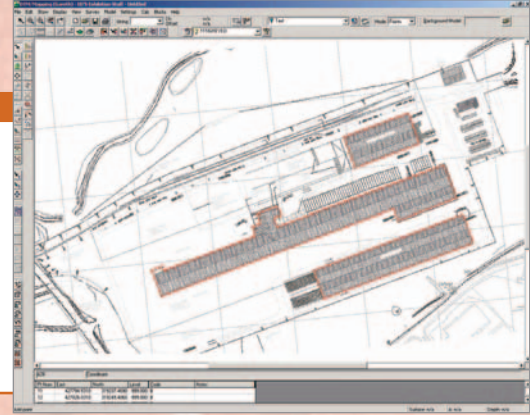Coordinate and Level Calculation is based on the use of Alignment Strings. Having extracted the Alignment, Chainages and Offsets along the geometry can be converted into coordinates. Working in two ways, NRG can create Coordinates and Levels from the String or relate a Coordinate and Level back to the Design. The Design holds information on the position of the Inner and Outer carriageway edges, which allows Offsets to be calculated from these elements

rather than purely from the Alignment String. This offers enormous flexibility for the User.

Information on any element of the Design can be imported, applying Offsets as the calculations occur.

Calculating Chainage & Offset from XYZ
One of the many extremely useful features of NRG Software is its Compare Routines.

Data in the table can be compared to an Alignment. The actual Chainage of each Point can be displayed as well as a whole range of variables associated with the position, the road level projected to the Point, the ground level at the Point, Offset to a Tunnel Axis etc. All of these variables can be printed, shown on a plan – ideal for showing Blockups – or exported.
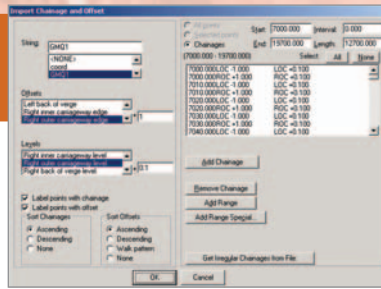
Trackwork

Checking Railway As Builts or Refurbishing Trackwork is made simple using the Lifts and Slews Option within NRG. Checking the As Built Rails using the 'Versine' method is also automated within the Software. The Rails are surveyed and those points selected in readiness to be compared to the Design.

A table can then be produced to show the Chord Length surveyed between each Point; the Surveyed Gauge; the actual and theoretical Versine Offsets.
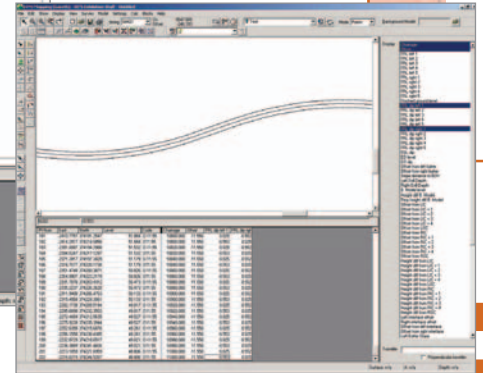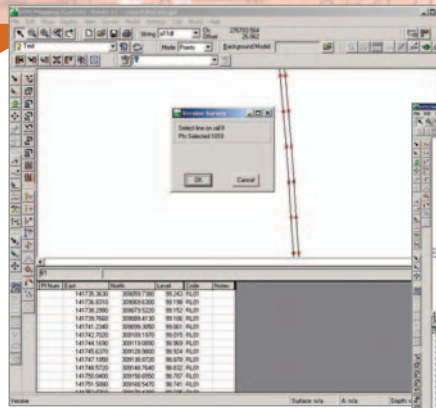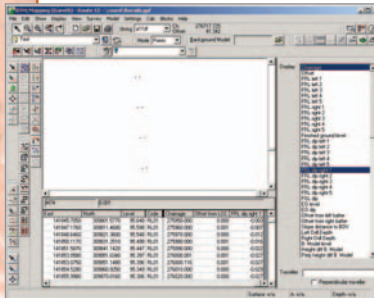
Batter Rails / Profiles

Using the Export Batter Rail or Profile Routines the calculation process becomes more pictorial than complex. Select the relevant Strings by clicking on screen and choose the Chainage Range for calculations. Site wide variables such as Offsets and Traveller Heights are stored by the system so that they only need to be entered once. Reports can then be produced in a number of formats.
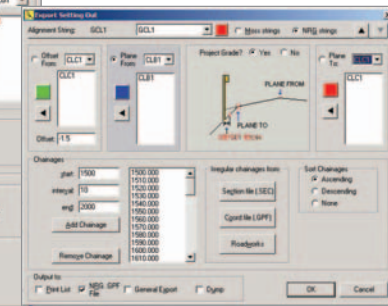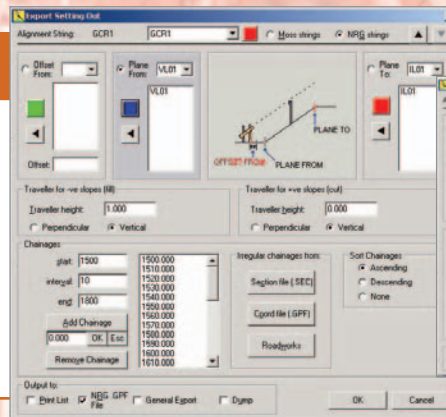
Setting Out / Dimensional Control

Background Models

The relationship to other models can be determined with features such as: cut, fill, depth, find nearest point etc.

Parallel lines can be created by projecting a line at grade until it intersects the other model. Cut/fill interfaces can be exported for Setting Out.

Cogo Functions

A number of Cogo/Calc functions have been incorporated into the NRG System to aid interrogation of Information. All of these functions are intuitive to use and accessible through a Toolbar Button.

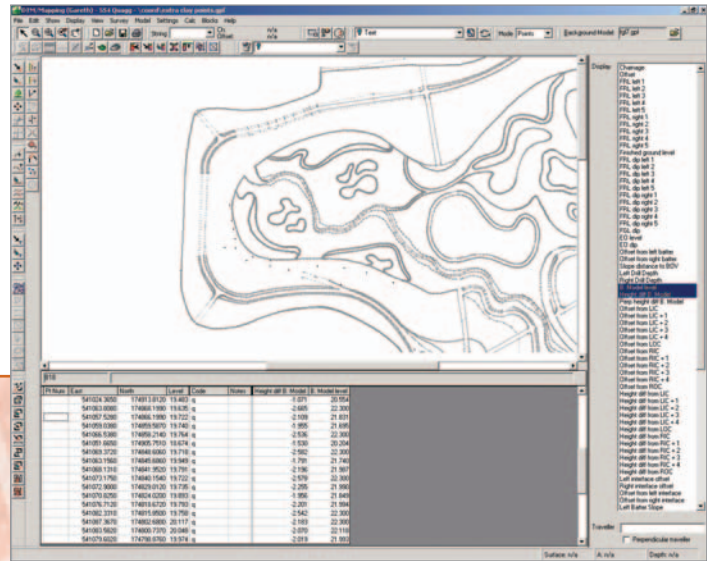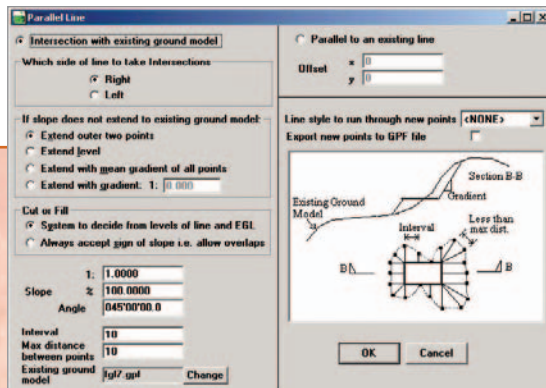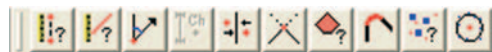|		
Point to Point Information	Calculate Ray and Distance information between two Points and Add Points along the line
Line Information	Calculates Distance and Number of Points based on the selected Line
Polars	Adds a Point based on a Bearing and Distance from a known Point
Chainage and Offset	Imports Chainage and Offset in a tabular form
Align Points	Realigns Points to a selected line
Intersections	Calculate the intersection point of two Lines or Curves
Area by Coordinates	Calculates an area based on User selected Points
Add Curve	Adds a Curve, based on User defined parameters through selected Points
Selected Statistics	Calculate lengths of line and feature statistics based on the currently selected Points
Centre of Best Fit Circle	Draws 'best fit' circle based on User selected Points

Exporting to Instruments

Once the calculations have been made, use NRG to transfer the information directly to your Field Computer or Instrument. Leica, Trimble, Sokkia, Nikon and Topcon are major Instrument manufacturers supported by NRG.

Call 01248 681240 now to receive a FREE TRIAL CD of NRG Geospatial Engineering Software

Geospatial Engineering Software

Setting Out / Dimensional Control

Handheld Devices
### Workabout Engineer

Coordinates and Alignments can be stored on the Psion Workabout, along with Station Coordinates; Road Crossfalls, Widths, Verges and Batters; Shape Files for Tunnels etc.

The NRG Workabout Engineer Software can be used to calculate Batter Rails, Profiles, Road Pins, Tunnel Overbreak/Underbreak, Track Lifts and Slews, Building Corners and Offsets. The NRG Workabout Engineer Software also provides a host of Field Calculations, such as Areas; Volumes; Best Fit Circles; Intersections of Lines, Arcs and Spirals; Resection by Distance, Angle or both.
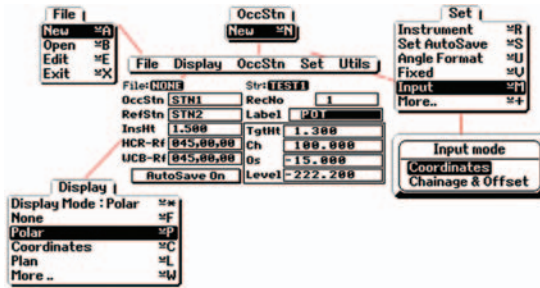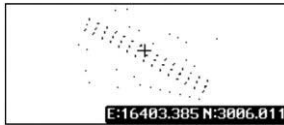
Traversing is dealt with by our Traverse Observation and Reduction Program. Adjusted in the Field using a Bowditch type of adjustment or downloaded to NRG PC Software for detailed analysis.

Setting Out by Coordinates: Select point by name, number or graphically on the screen.

The Workabout connects to any instrument and will calculate the Lifts and Slews directly from surveyed Points.

Handheld Devices
### Pocket Engineer

A little gem

The Pocket Engineer Software will run on virtually any Windows CE device, utilising the high definition graphics screens and easy to use Windows environment. Load an MX file directly to the device, type in Coordinates and Alignments or load them from a spreadsheet and a vast range of engineering utilities are instantly available

Set Out Tool Bar

Point/features list

Polar Coordinates

Display/COGO toolbar
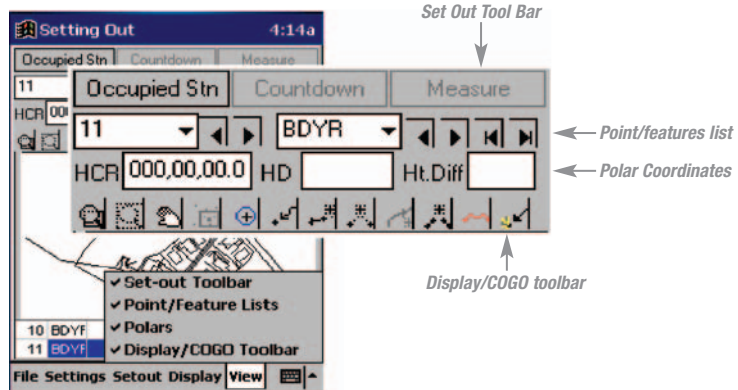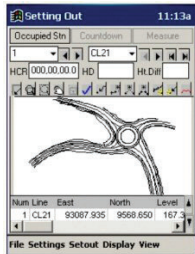
Cross Sections
Cross Sections can be taken through Design files in order to Set Out Batter Rails, Profiles and Pins, or simply to view what's happening.
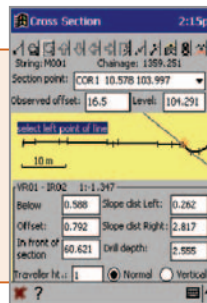
Junctions
For more complicated Bell mouths or Junctions use the 'Add Curve' option to develop Coordinates and Levels by intersecting two lines and entering a radius. The Levels are then calculated from the plane of the Points.
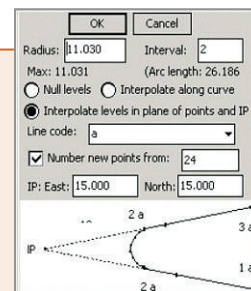
Batter Rails & Profiles
Batter Rails & Profiles can be pre-calculated from Alignment and interface Strings.
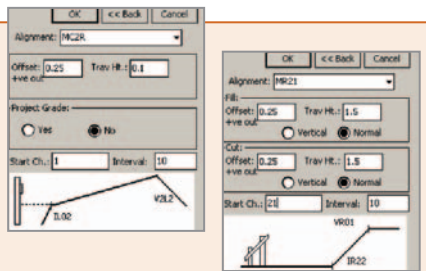
Instruments
Most instruments are supported by NRG software and can be used conventionally or in 'one man' mode.

01248 681240 • www.nrgsurveys.co.uk

Cross Sections

Viewing, Editing and Printing of Cross Sections

Cut Cross Sections through a model, hand enter, import or convert from Co-ordinates against a pre-defined Alignment.

NRG Roadworks module gives you the option to add in the Earthworks Outline with Construction Depths and apply Edge Details.

The Cross Sections Editor within NRG allows the User to take, view, edit and print Cross Sections both quickly and reliably. Based on 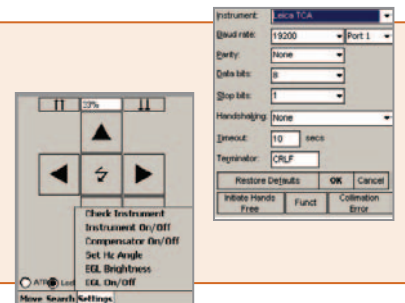an existing Alignment String, Cross Sections can be taken at any point on the job, or over any Chainage Ranges. The User can take Sections through a Survey to compare to the Design Sections in order to highlight potential errors in the designed Batter Slopes and extending them where necessary.

Open Multiple Cross Sections in order to view changes that have been made. View the build up of Interim Measures.

Create Long Sections, at any Offset based on the existing Sections or the Digital Design Information.

NRG allows the User to organise the Cross Sections Editor to their own requirements. Colour and monochrome Line Styles are provided to ease viewing of Multiple Cross Sections.
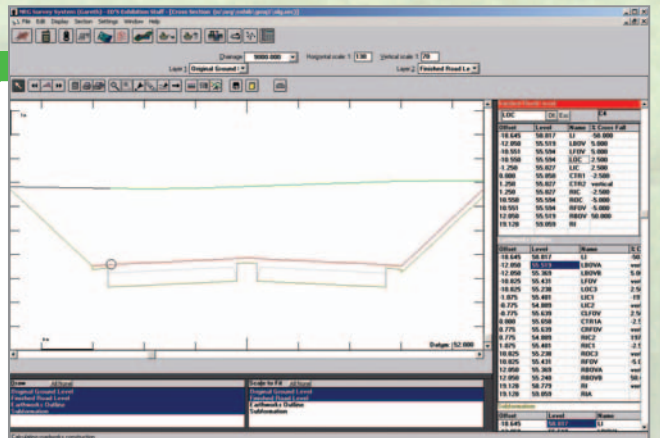
Dip Files

Dip files are used where depth measurements have been taken at Chainage and Offset. The dips can then be used to create a new sub-surface – ideal for topsoil strip, pavement thickness etc.
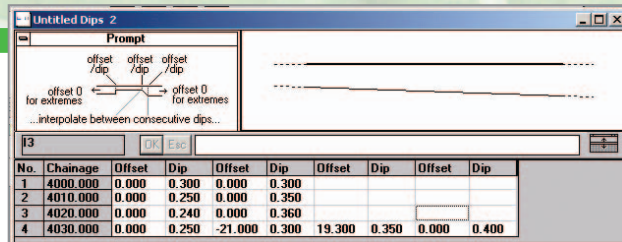
Editing / Viewing

Manul or automatic scaling can adjust the section to display a specific layer or the whole section. Add and delete points in a section. View the whole area as a perspective. Organise the sections editor to your own tastes.
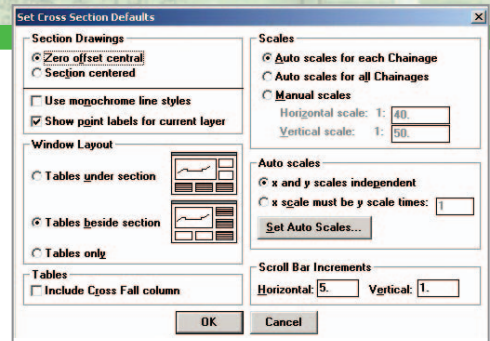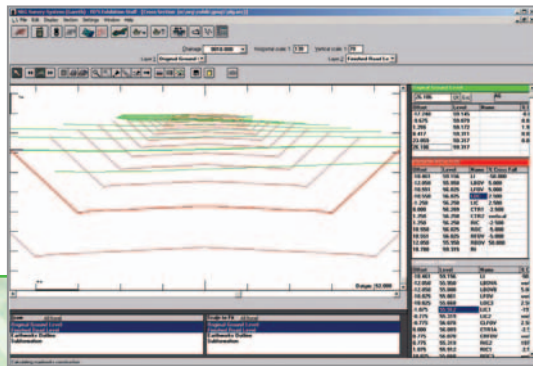
New Layers

New layers can be generated to deal with a wide range of measurement problems, such as determining the payment line where the lower of two layers is to be used.

Benching can be accommodated using the new layer function. A benched layer can then be generated to suit the benching parameters on site.

Geospatial Engineering Software
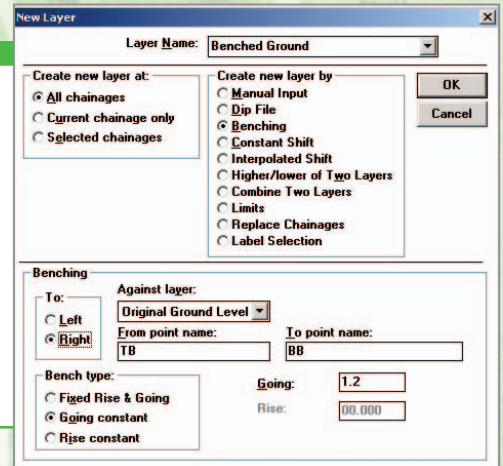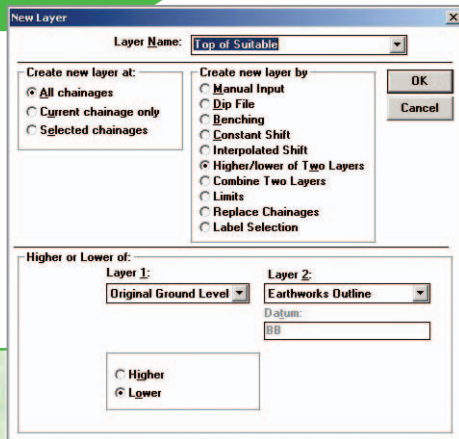
Cross Sections

Printing / Plotting / Export

Clear customisable reports can be generated containing the Cross Section, Areas, Roadworks reports and details of offsets and levels. These can be printed or exported to Cad.

Plot the sections to any windows compatible printer or plotter.
Set up the exact output required.
Print any required information on the section. Easting. Northing Level, Cross fall, Offset etc. Create Roadworks reports and area breakdowns
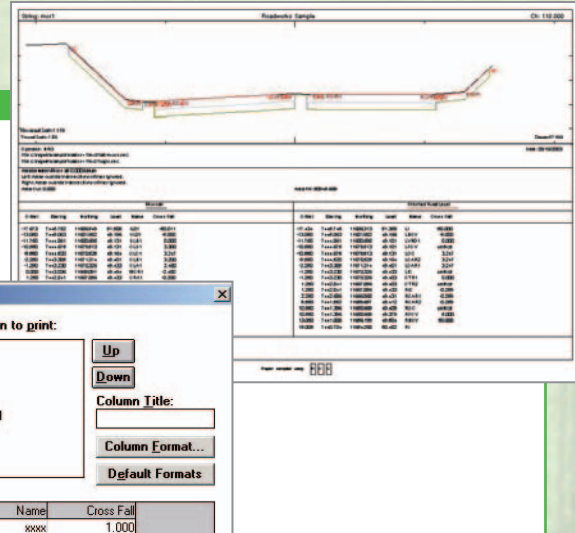
Areas

Areas can be automatically calculated between two selected layers.

Full control is given over the extension options (how the layers join if they do not already). With multiple files open in the sections editor simply pick Layer 1 and Layer 2 from the drop down list of available layers and areas are automatically calculated between the two.

Volumes

Measure earthworks volumes accurately and swiftly by cross sections.

All the materials can be calculated at once with multiple layers being used.

Multiple layers can be drawn with unlimited volumes being calculated between layers.

NRG - developed for and used by practising Engineering Surveyors

Data Capture

NRG supplies data capture facilities to suit every pocket and preference

Workabout Surveyor
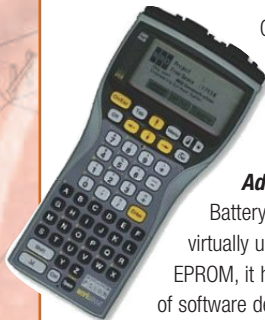
Choose the good reliable Psion Workabout for a very cost effective and reliable solution, we've been selling these for nearly ten years and it's still a real workhorse.

Advantages:-

Battery life is weeks as opposed to hours, data storage is virtually unlimited, data can be stored directly to secure flash EPROM, it has a full alpha numeric keyboard and has 10 years of software development behind it.

Station Set-ups -
- Station set ups include FREE stationing by several methods.
- Errors are reported on the station set up

Graphics -
- Display graphics of the survey in progress.
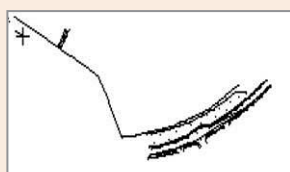
Traverse -
- A traverse editor to view and edit and close traverse observations.
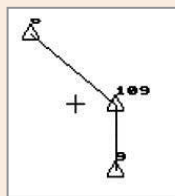
Export -
- Export to a variety of formats in addition to NRG

Simple to use -
- Simple to use interface with all the functions available from drop down menus.

Instruments -
- Connects to a range of instruments.
- Controls robotic instruments.

File Editors -
- File Editors give the user control over the control station files, coordinate files for setting out and the ability to edit observations in the field.

Features -
- Features Editor to edit field codes.
- Field codes control the way a survey is drawn.

Geospatial Engineering Software

Data Capture

WINDOWS CE

NRG survey programs on windows CE were developed as a logger for all types of surveyors, it logs directly to an MX input file and outputs to a wide variety of formats.
Windows CE devices range from high street devices such as the Compaq iPAQ‰ to fully ruggedised systems such as the Itronix‰ (formally Husky) and the Panasonic Toughbook‰.
The devices offer tremendous capabilities in terms of internet access, high resolution graphics screens and huge memory capacities. Coupled with Windows intuitive operating system make the devices ideal for 'windows literate' surveyors.

Windows CE

Features Library -
- User definable features & line style library that gives control over final drawing.
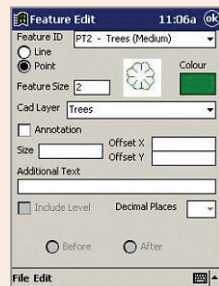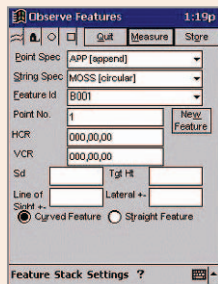
- Call up a predefined list of feature codes or add new ones in the field

- Use a stack function to store repetitive codes while sectioning
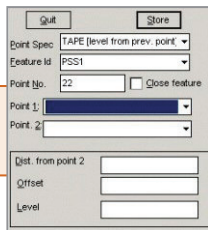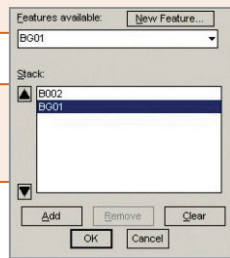
- Tape hidden points

- Export to most Data formats
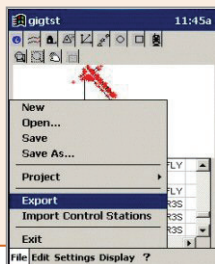
MX INPUT (*.inp)
1. MX Traverse
2. MX Genio (*.CRD)
3. Text (*.txt)
4. NRG PDF Psion Data File
5. NRG GPF Coordinate File
6. NRG Traverse file (*.trv)
7. LISCAD Field File (*.fld)
8. DXF (*.dxf)
9. SDR Coordinate File (*.sdr)
10. SDR Observation File
11. LSS xyz file
12. LSS Raw

- Parallel lines
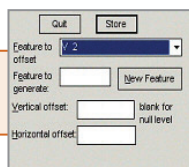
- FREE station, multi ray fly station and traverse options all supported. With error checking as standard
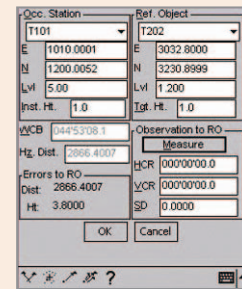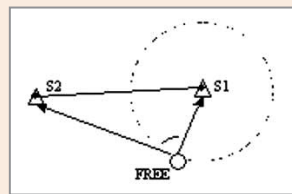
- Easy graphical interface
- Communicates with virtually any instrument
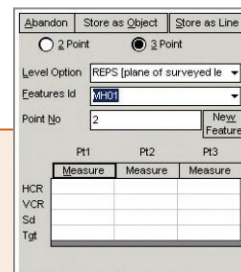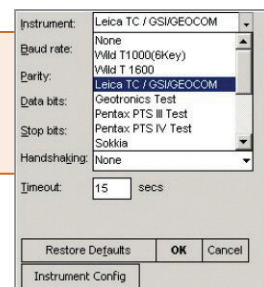
- Special Functions to survey Rectangles and Circles
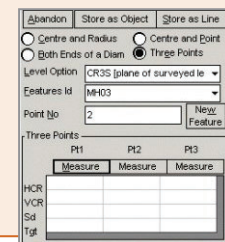
- Function to determine heights and widths of objects
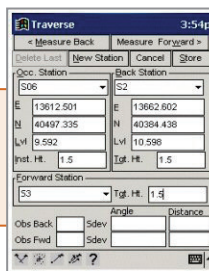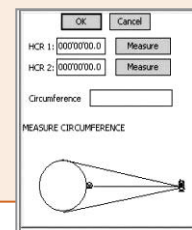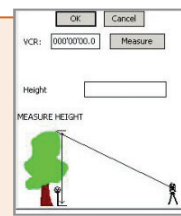
- Full Traverse functions

Data Capture

Display

The display menu, has the options to toggle between the editing table and picture display. Through **Settings**... the way the picture is drawn, such as picture proportion, view and plan rotations, can be customised, and choosing **Symbols**... The drawings appearance can be changed by selecting appropriate, colour, line and point styles. Use **Redraw** to show any changes.

A MX GENIO file can be important as a Background, this can be used as a boundary to a survey.
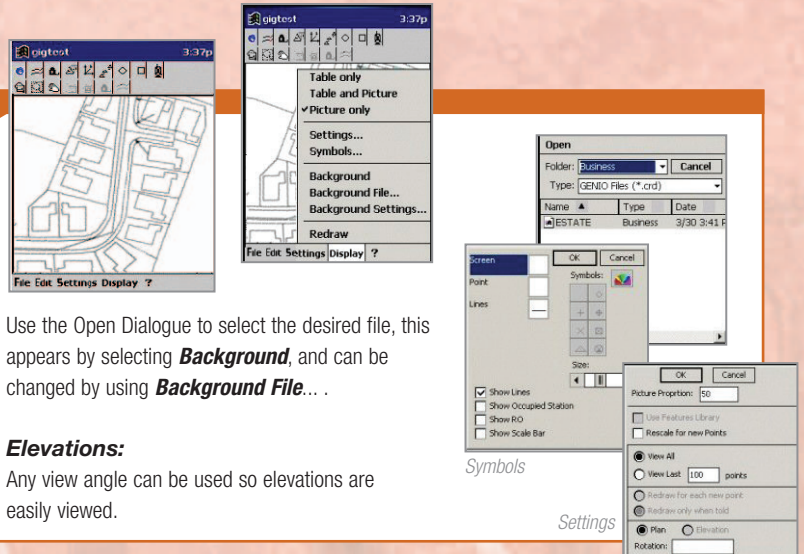
Use the Open Dialogue to select the desired file, this appears by selecting **Background**, and can be changed by using **Background File**... .

Elevations:
Any view angle can be used so elevations are easily viewed.

Symbols

Settings

DTM Map Data Logging Utilities
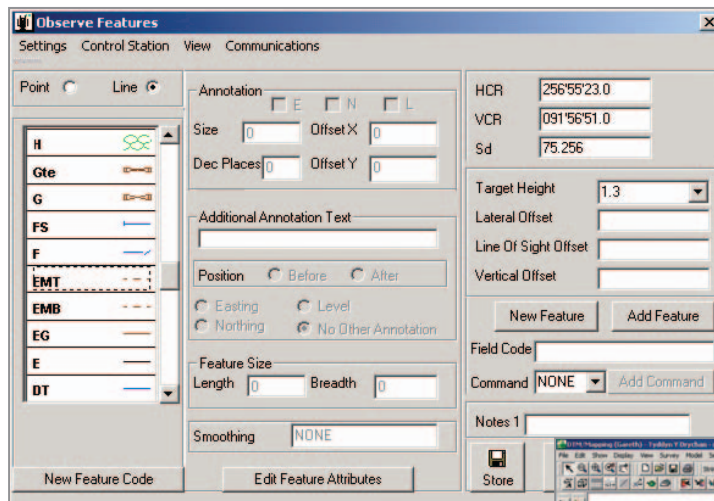
- DTM Map has instrument comms built in.

- Use the survey processing software in the field and log directly to it.

- Logging directly to the processing package cuts out a whole set in the survey process, gives more control in the field and can be proofed as it is surveyed.
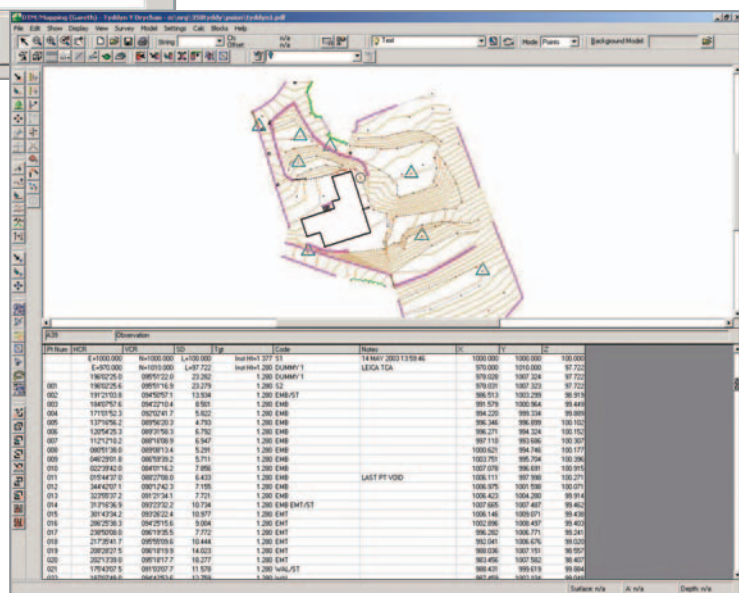
For further information call us now on
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Geospatial Engineering Software

Digital Terrain Modelling

DTM Modelling in NRG is designed for Contouring, Volumes, Cross Sections and Visualisation.

Triangulation

Modelling is by Delauney Triangulation
Creating a triangle mesh is as easy as a mouse click.
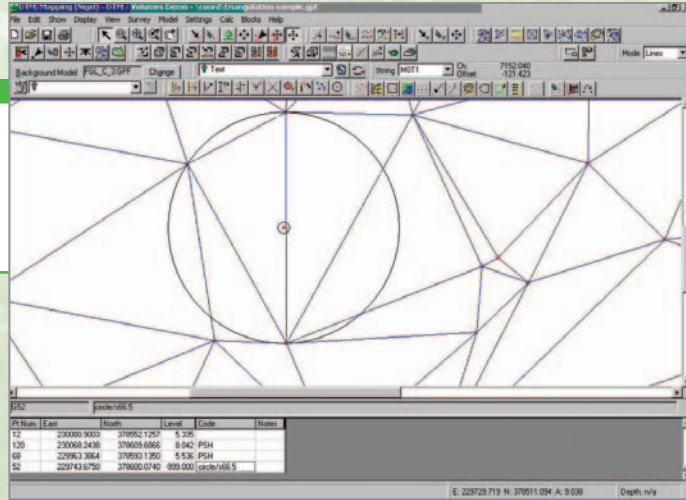
Breaklines / boundaries

In order to force the triangles to form correctly use of breaklines has been accounted for. Breaklines force the triangles to form along the specified line. Any line can be used as a breakline simply by telling the systems features manager. Boundary lines can also be used to stop the triangulation mesh being created outside the data set.

Editing

Editing the information is done via a spreadsheet style interface below the view Window. The interface shows all Observations or Co-ordinated information and Field Codes in an editable manner.

Editing the data will change the drawing.

Editing the drawing will change the data – RAW data is never lost.
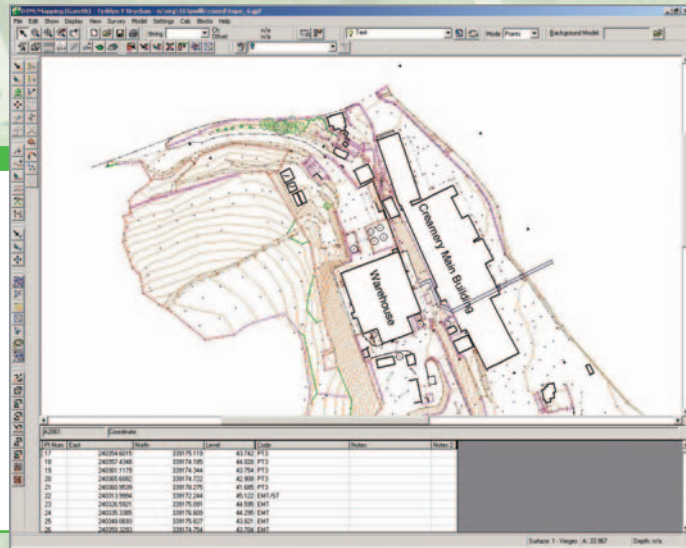
Surfaces

Different surfaces of the model can be assigned, for instance different areas of construction or surface finish, these can be set by a number of tools – crossing line, size, ratio, lasso, polygon, parallel to line etc. Depths can be associated with Surfaces for Volume Calculations
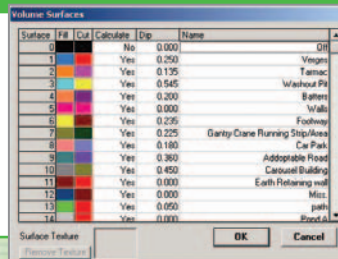
Contouring

Contours styles are all customisable

Contours can be:
- *Annotated*
- *Smoothed*
- *Line styles / colours altered*
- *Shown as colour shading*

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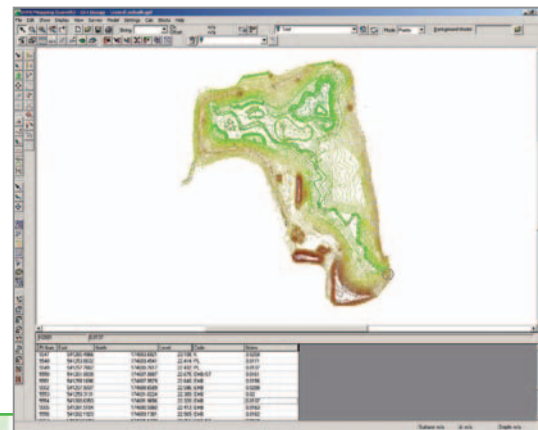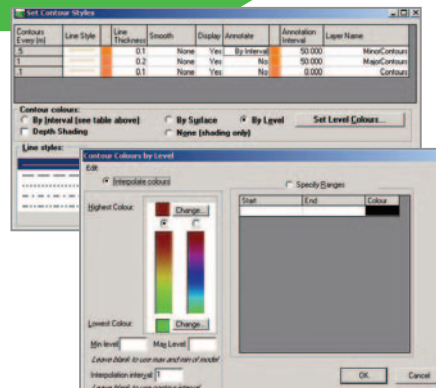
Digital Terrain Modelling

Volumes and Isopachs

Volumes are calculated between surfaces. Any number of surfaces can be associated with a model.
Volumes are then categorised by each surface and can be further categorised by depth or even gradient of slope.
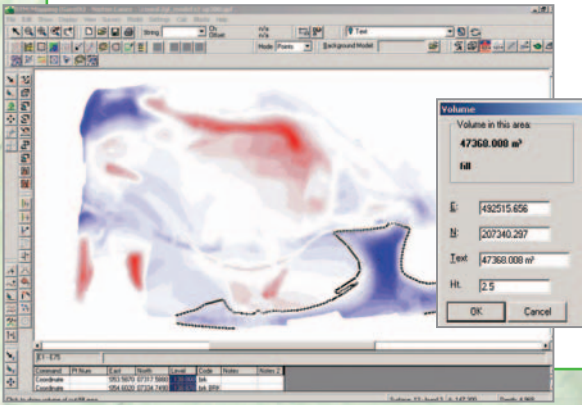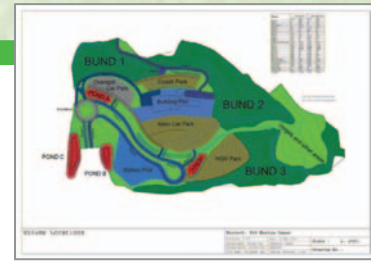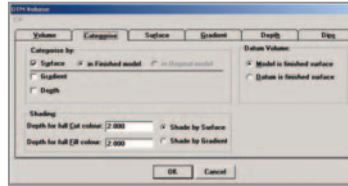
Isopachs display depths of materials on the site and specific Cut / Fill areas can be identified with individual quantities reported.

Morphing

NRG Model Morpher allows the User to morph a model by drawing the limits of morphing then adjusting the model until a specific volume is calculated. See it happen in Real Time in Cross Section and the Render window – Ideal for designing borrow pits or landscape mounds.

Hatching

Draw individual areas of coloured hatching to highlight buildings or specific locations. Click the points to act as a boundary and choose the style and colour of the hatching. Hatching can then be toggled on or off at will using the show menu.

Printing/Plotting/Export

Plans can be produced by dragging the plot area over the required area, specifying a scale and rotation. Create a custom banner for that individual company image. A Banner can be produced with imported image files and dynamic text fields for automated addition of dates, scales and rotation etc.

Data can also be exported to the majority of software packages, among those supported are :-
• *AutoCad dxf • Mx Genio • Leica GSI • WinALC • LSS*

Boreholes

Boreholes can be introduced to create sub-surface layers for export.

Volumes of different materials within models can therefore be easily generated

Cross Sections

Cross Sections can be taken through the model at specified chainages along a design alignment or one purposefully created.

Dynamic Cross Sections
Dynamic cross sections can be drawn on the screen, updating as the section is moved across the screen.

Merging Data

Facilities are provided to merge data sets together, so if only a small area changes the entire site does not need to be resurveyed. Merge an entire model into the existing one or merge only within a boundary.

Geospatial Engineering Software
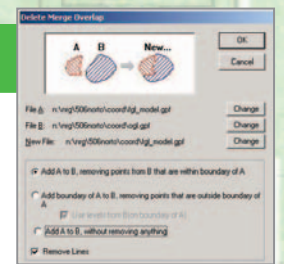
Topographic Mapping

NRG Topographic Mapping is a streamlined and easy to use process of field coding that results instantly in a finished drawing, working entirely with the raw field observations. Our unique 'command' set allows the Surveyor to control the way lines and points are handled by the computer. Combined with the User definable features list it is possible to record a minimum amount of points with the simplest of coding techniques. Features such as manholes, gullies, gates, overheads, fences, trees etc. can all be picked up so their footprint is accurately represented on the plan. Points can be included or excluded from the model. Lines can act as Breaklines, Boundary lines or just Feature lines. It's no fuss and the coding system is easy to remember. Unlimited additional data about each point can be stored, such as tree height, spread etc. creating a full GSI database.

Features Libraries

The Features library is fully customisable giving the User complete control over the way lines and points are drawn. The coding system allows line and point features to be related to a field code, once the system has found a match the appropriate feature is drawn. Annotation can be attached to specific Features allowing text to be automatically drawn. Curve fitting can be applied to selected lines.
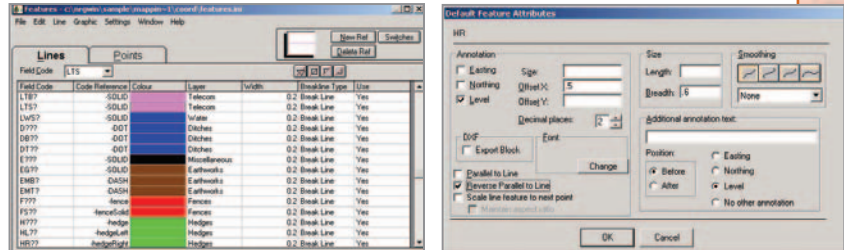
Feature Codes / Control Commands
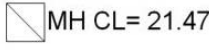
A number of control commands have been included to give extra control over the field codes. Referred to as switches they can override the features manager, by adding an additional field code.
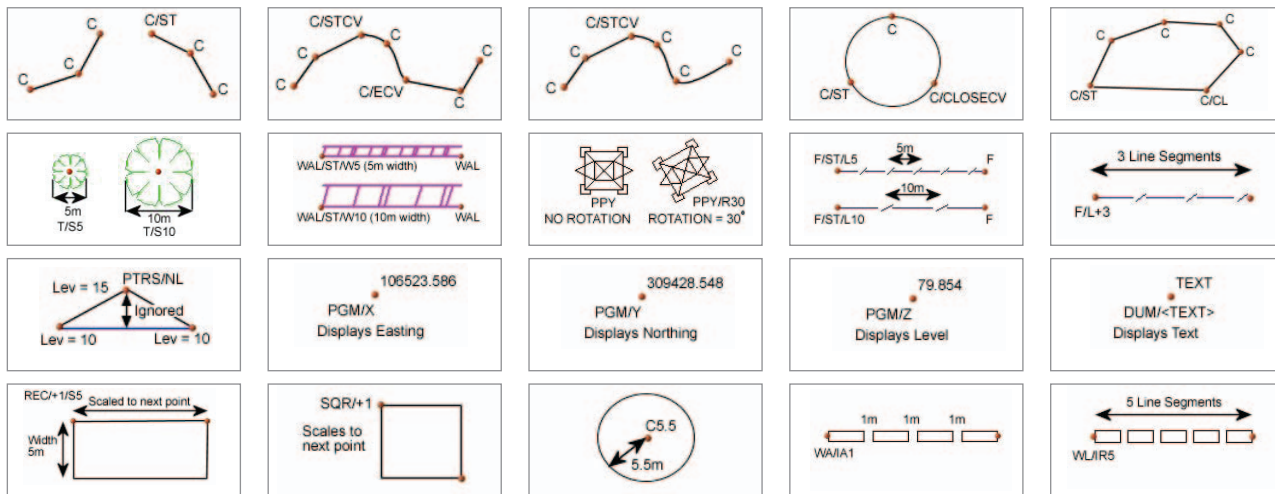
Text Functions

A number of text types are available…

1. Free Text - Text that is placed on the screen, rotated, scaled etc, using a text editor and is independent of the drawing, used for street names, building names etc.

2. Attribute text - Text that is attributed to a point, 'MH' for instance can be set as an attribute to the field code PMH where the text is drawn adjacent to a point, add the level of the point as an attribute as well.

**3. Column text -** Any column in the editor table can be set to display as text on the plan. Often used to store further information about features and display at will, but can be used with great affect with all sorts of data.
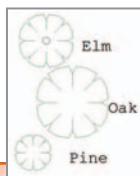
Line & Point Styles

A number of line and point styles are available as a default, these can be created or altered using the graphical editor.

Features / Line Editor

New features can be created graphically via a powerful editor allowing you to create a custom defined reference definition for point and line styles.
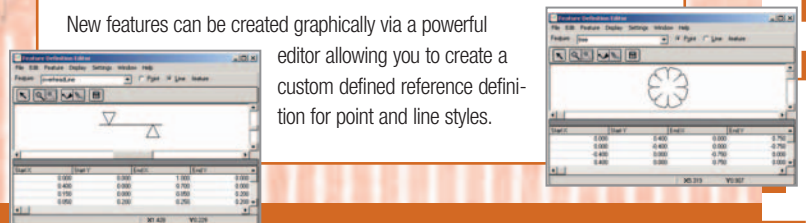
Topographic Mapping

Point Edit

Add Point at cursor position
Delete nearest point
Add point feature
Drag Point
Add a block of points
Drag a group of points

Line Edit

Draw line
Shift line (and points)
Delete Line
Parallel Line
Change Line Style
Reverse Points on Line

Parallel Line

Parallel line produces a parallel line by either intersecting another model at a gradient or just setting the X, Y offsets.
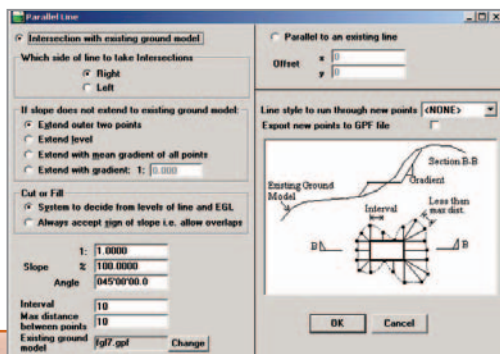
Traverse Reduction

Traverse reduction is carried out using either a traverse observed using our dataloggers or by using the field codes /FL or /FR to signify it is a traverse observation. The software will then show all connecting legs, the standard deviations of the angles observed, along with other statistics about the various traverses in a survey. The traverse can be reduced at any time, even added to during the progress of a survey. Since the raw observations are never lost with NRG then traversing is really rather easy and part of the intuitive process.
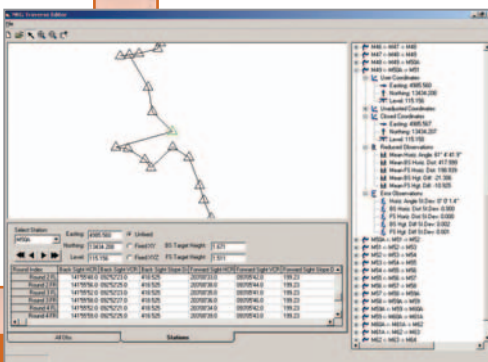
Raster Overlay

Raster images can be used as a background which can be rotated and justified to the user coordinate system.

Pick two points on the raster image which the coordinates are known for. Select the appropriate points on the image and supply the true coordinates. The image will be rotated, scaled, coordinat-ed and displayed as a background. This literally allows the user the add coordinated points pictorially (i.e trace the site outline.)
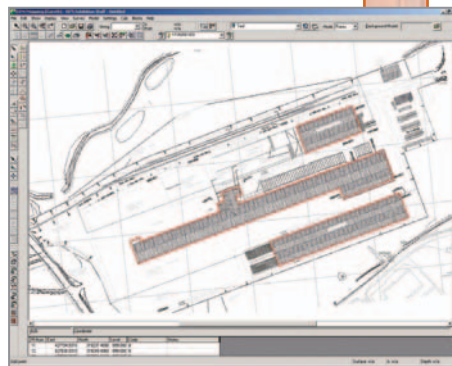
Data Capture

Real time data capture allows the user to log survey information directly into the mapping package. Observations are logged directly into the editor database and line or point features can be assigned to each point. This function means the survey has been processed before the site has been left.
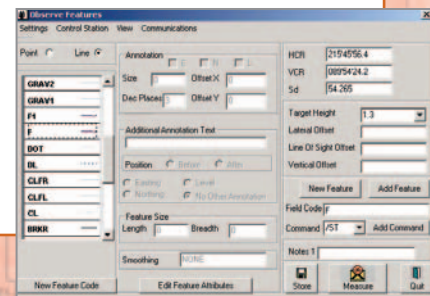
Data Import & Export

Import

Import routine supported for. DXF, MX Genio, SDR Raw Data, Rec Elta Raw data, Nikon Raw Data, Leica GSI, MX .FIL models and PanTerra Exit Files as well as generic ASCII imports.

Export

Data can be exported to:- DXF, MX Genio, ICS as well as most instruments and other modelling and survey packages.

Drawing export to DXF is very refined. The full drawing as seen in NRG will appear in the CAD package, a 3D drawing can be sent with a 2D overlay to mimick our complex line styles not support by AutoCAD or a 2D files created with full control over by layer colours, linestyles etc.

Geospatial Engineering Software
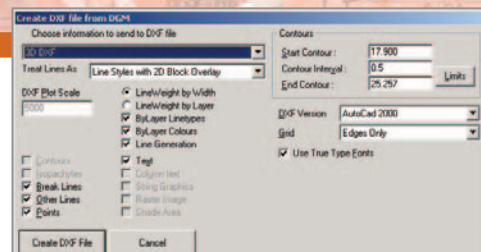
3D Rendering

A 3D Render Engine suitable for Site visualisations and Drive Throughs. Load any existing gpf files with Triangulation Models and the file will be instantly Rendered based on the existing Triangle mesh. Import an AutoCad dxf or 3D Studio Max Raw file into the NRG Renderer.

Multiple Models

Multiple files can be opened simultaneously allowing complex models to be built up. As many models as required can be 'stacked' on top of one another by opening an additional file. Any number of render images can be opened simultaneously into individual windows.
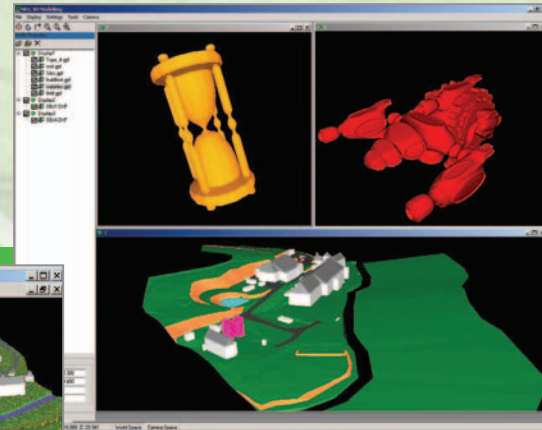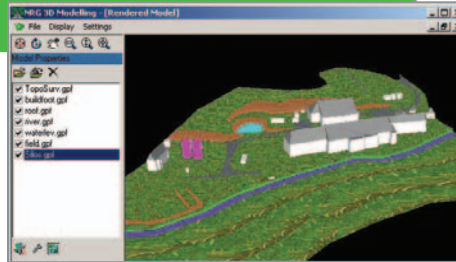
User Control

Pan / Zoom / Tilt

Pan, Zoom and Tilt controls are available through a toolbar or through mouse control.

The left mouse button controls 3d orbit, the centre button zooms and the right pans the displayed image.

Exaggerate

The vertical scale can be exaggerated to increase topographical relief over the rendered image. By pressing up on the button.

Import

The render engine supports the import of a renderable dxf file or 3D Studio Max file. The file will be loaded and the rendered surfaces retained. Scanner Point Clouds can also be imported into the Renderer ready for manipulation.
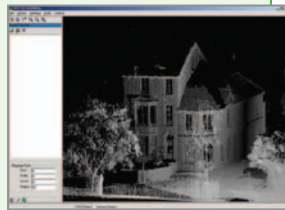
Drive Through / Fly Over

Create Drive throughs along any existing Alignment Strings controlling the View angle as required or walk around on foot. Options are included for Terrain Hugging, eye height, drivers Offset and Bomb bay (flyover) views.
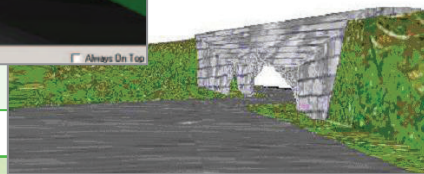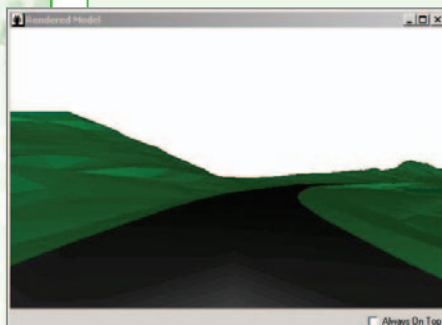
Lighting

The environment lighting can be controlled by adjusting the tolerances for Red, Green and Blue.
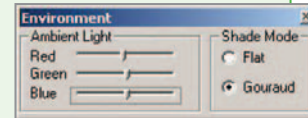
Settings

Using the settings menu the transparency of each model can be adjusted. The underside of the model can be shown or hidden. Triangles, the rendered faces or both can be displayed. The layer colours can be set to an individual colour or can be controlled by the colours or textures set in the DTM Editor.

Cross Sections

Cross sections can be dragged through the rendered model.
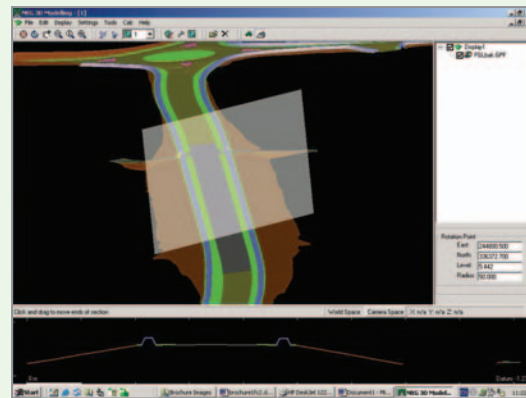
Site Lines

Coordinates can be entered into the system and any obstructions will be highlighted

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Volume Management

Volumes manager has been designed as the final solution to volume management. Volumes calculated elsewhere like dtm or cross sections can be collated and organised. Providing a graphical display of material locations and movement. Mass hauls being calculated at any epoch of the job minimising transport costs.

Volume files can be taken from a selected purpose in the project. Assigning all or selected parts of your volume file to measurement areas and locations. Material types and categories can be customised to suit.

Mass Haul
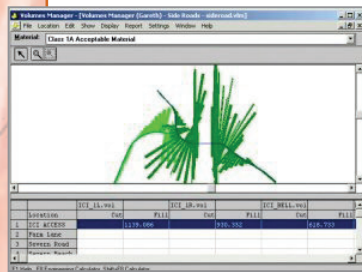
Volume manager can calculate optimum Mass Haul quantities and therefore total costs. The calculated locational cut and fill volumes are placed within a table. The cost of moving 1m3 per metre, to and from each location is input into a costs table. When calculated Volumes manager gives the optimum movement of materials and total movement costs based on, distribution of cut and fill, and distance between locations.

Reporting

Reports can be created on any or all of the current locations and materials. In the form of tables or graphics, suitable for onsite management. You can print tables of Mass Haul costs for chosen materials .
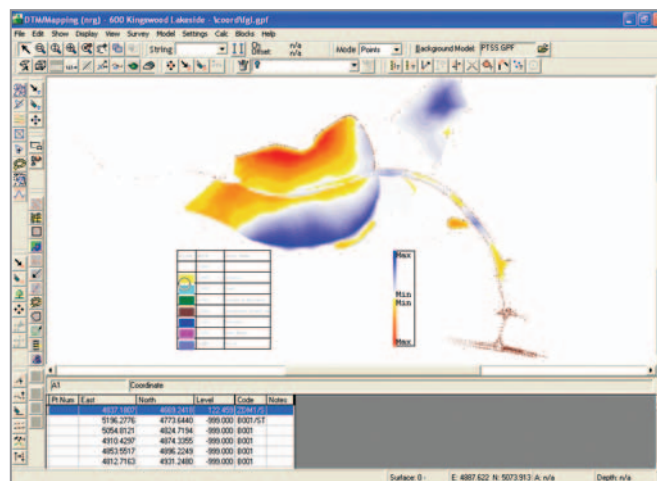
Once you are happy with your results you can print your plan, table, or an Earthworks Schedule.

- *Plan*- a plot of the graphic representation of the material volumes and categories.

- *Table*- a table showing the volume totals for each location's materials and categories.

- *Earthworks schedule*- a standard earthwork schedule showing location volumes divided into their respective materials and categories.
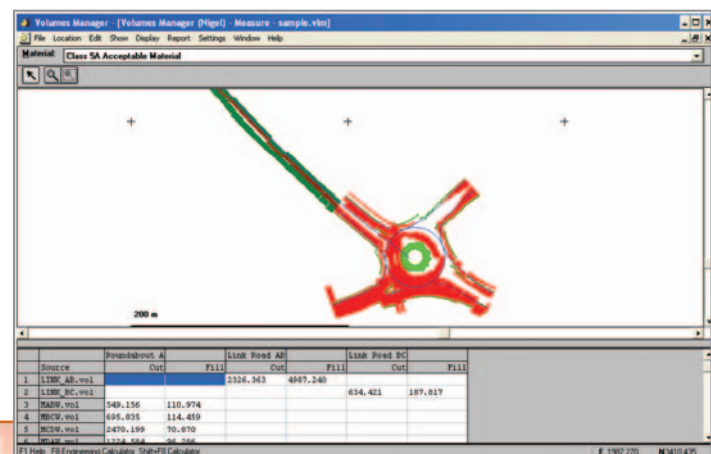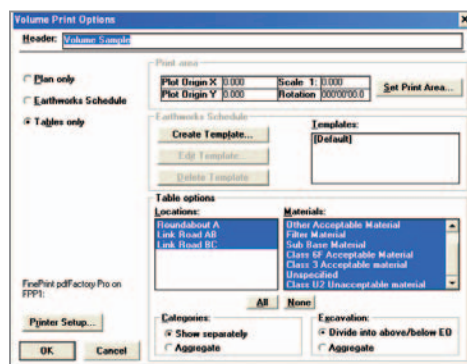
NRG - Get it right first time!

Geospatial Engineering Software

Tunnel Control

The tunnel control module is designed to check the clearances for the final tunnel alignment.
Calculating overbreak and underbreak volumes along with a range of setting out options for
laser guidance and tunnel floor intersection points.

TUNNEL ALIGNMENTS
The tunnel alignments can be entered either manually or by extracting digital
design info. Errors can be checked and eliminated.

Tunnel Shapes

Shapes are hung from the Alignment to represent a design
Profile or trains kinematic Envelope and react with the Cant
of the Tracks in a variety of ways to meet most Design
Criteria. Tables of shapes can be used
and the system will interpolate
between them.
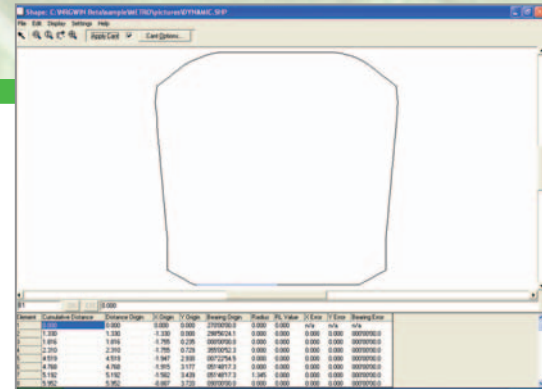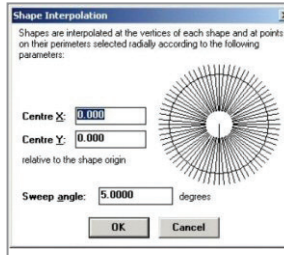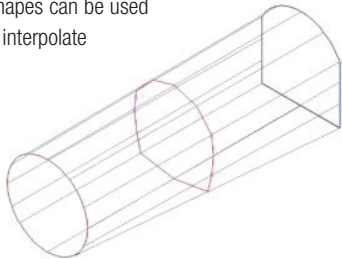
A comprehensive list of options as to how Tunnel Cants should be applied are available.
You can use a proportion of the whole Cant. The Y Offset to Tunnel Centre can be
Vertical or Perpendicular to the floor. The X offset can be Horizontal rather than Parallel
to the Tunnel Floor. All Offsets can be rotated with Cant.

Laser Offsets

Two alignments can be compared
i.e that of the tunnel and the
laser. Select the chainages and
supply details of how the tunnel
centre and the target are related
to the setting out string. A report
is produced at the required
chainages with offsets and height
differences.
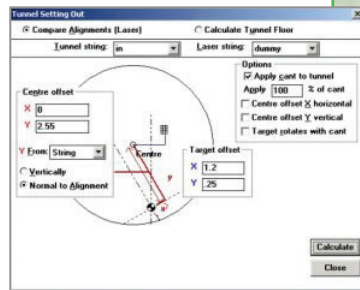
Ring Co-ordinates

The actual ring centres can be generated from
the track alignment using the add range special.
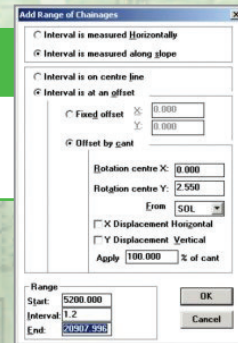
Overbreak/Underbreak

Reports can be created after running a wriggle highlighting overbreak
or underbreak areas and reporting on them. The report shows the
maximum and minimum clearances for the height and the width along
with over/underbreak and pinch points

Wriggle Surveys /
Clash Detection

A tunnel run works in much the same way as a volume run: a Cross
Sections window appears and works through all of the sections you asked
for. The process can be told to stop and report if a clash is detected.

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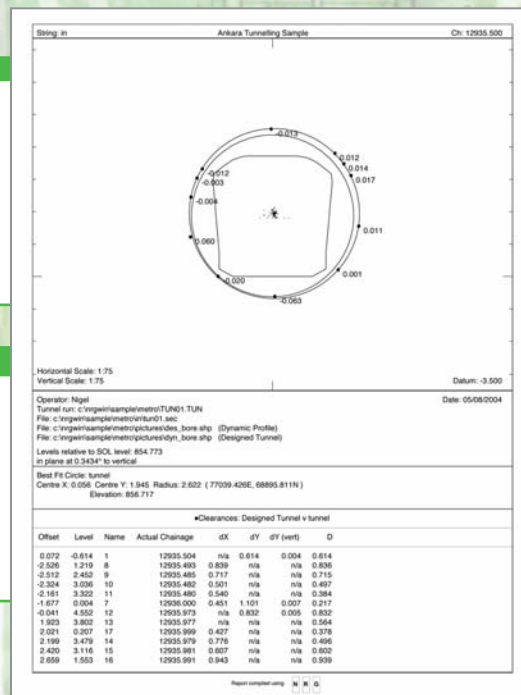
Deformation Monitoring

Monitoring module allows analysis of groups of points relative to movement over time. Tight supervisor controls are in place so out of tolerance points cannot be ignored and are immediately highlighted.

Base points are displayed true to their coordinates but any merged points from subsequent observations can have their movement exaggerated for clearer illustration.

The movement of a point is shown by a line joining it's new position to it's previous

position. The points can then be viewed in plan or in section. Real Time Monitoring is supported with an unlimited number of Leica or Topcon Total Stations attached by radio or cable links. The Software will prompt the instrument to resect it's position from stable points and carries out a least squares adjustment to determine the new occupied position. Error reports are logged to a file enabling the operator to view the results and residuals for each round of observations
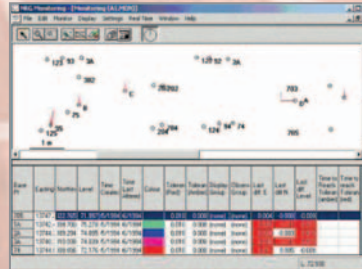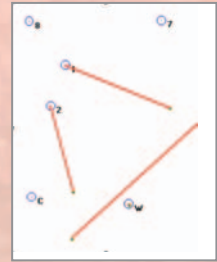
Importing / Loading Data

Base points are created manually or loaded from existing files. (gpf, .pdf, .csv. or level book files). The base points are displayed any relative movement displayed as a vector line from its original position. The monitored points are merged into the base point file from the new observations. Merged points are matched by name or radial distance from the base point. Every merged data set is given a time stamp on loading. All the recorded observations being automatically reduced into the correct part of the database. Monitoring points can be grouped together for easy access to the information. E.G East Side, West Side.
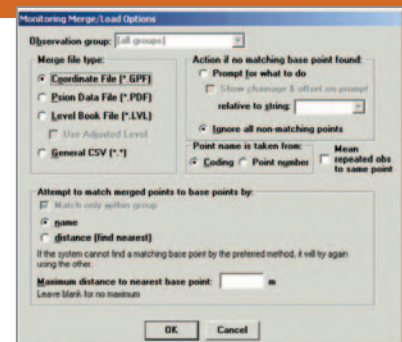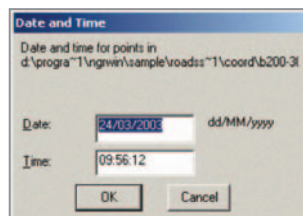
Cross Sections

Movement relative to works in progress such as tunnelling can be viewed. Current Heading positions can be viewed so that the direct effects of the works can be reviewed.
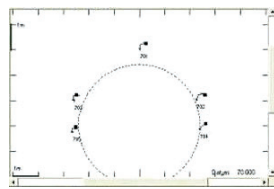
Supervisor Controls

Strict supervisor controls are in place. Requiring a password to load an out of tolerance point into the database.
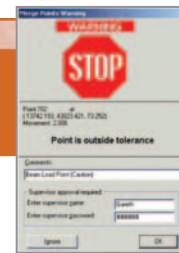
Viewing Results

The monitored information can be visually represented in a number of ways.
- *Plans • Elevations • Vector/Time Graphs*
- *Vertical/Time Graphs • Horizontal/Time Graphs*
- *Epoch • Vertical Horizontal and Vector Isopachyte Plans*
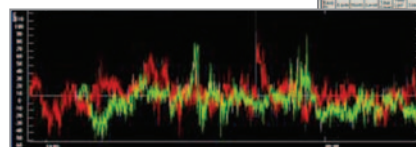
The information displayed can be controlled via:-
- Groups • Exaggerated Movement • View Bearing
- Graph Options • Time Options • Line Style Options

The monitoring information is shown in the table, displaying Base point information (coord level and time stamp), movement summary (information for the latest observation) and any trends (Tolerance stats like time to reach threshold of tolerance).

Reporting Results

A variety of report options are available to suit most peoples needs.
- *Showing Vertical, Vector, Horizontal movement over time.*
- *Time/Movement Graphs*
- *Tables*
- *Graph Options – Date Scale, Displacement Scale, Grid Style and Excavation Steps.*
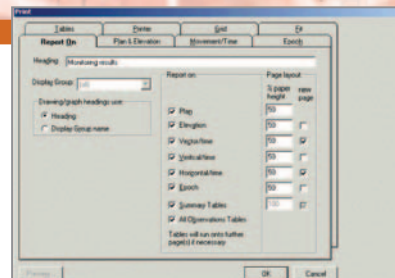
Choose the required reports and decide how much of the page to devote to it. Tick if you require a new page at any point.

Geospatial Engineering Software

Drainage

NRG Drainage Manager is designed to understand the needs of the on site Drainage Engineer. NRG Drainage Manager offers Tender, Interim and Final Measures along with Setting Out, QA Sheets, Stock Control and As Built Records.

Data Entry / Import

A manhole or gully can be added from known coordinates or derived from an alignment string based on schedules provided by the Designer.

A range of the standard blue book manhole types are included, which can be added to or customised

Levels can be entered manually or derived from a string or moss model.
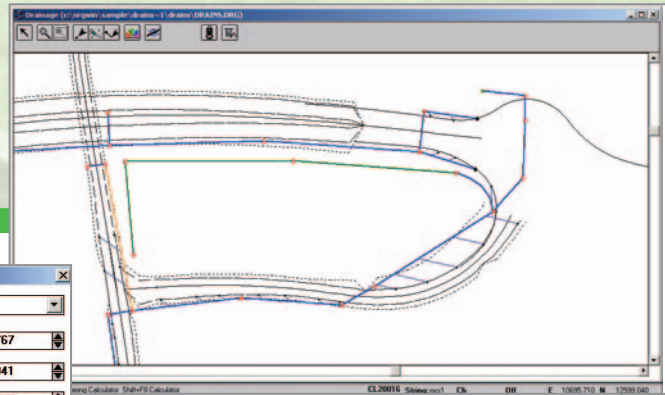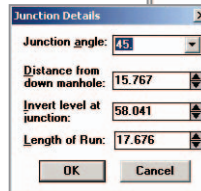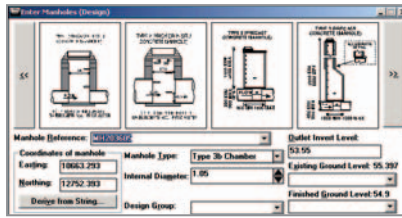
Pipe runs are added by dragging the cursor between the two manholes, choosing a trench type. Invert Levels and length can be entered manually or calculated by the system.

Connections are chosen from the illustrated types. The software will calculate the length of the branch and position of the connection and gully from the junction angle.

Clash Analyses

A clash analyses can be run to check the integrity of the drainage system and will highlight any potential errors in the layout so that amendments can be made.
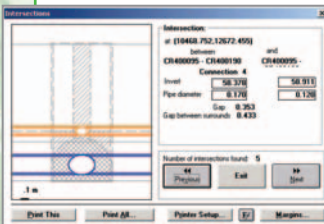
Take Off

Stock can be tracked through the job. The user having full control over how to track the stock. The stock database can be accessed and edited as necessary adding or removing items when needed. Check before setting out if the required components are in stock.

An extensive list of components, including, pipes, rings, slabs, lids, combined kerb drains, fin drains are used to give you construction materials for each type. Alternatively create your own to suit specific needs.
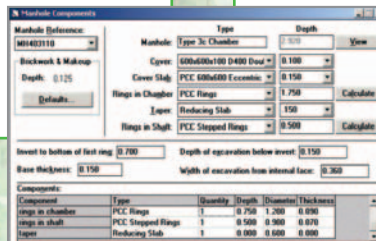
Set Out

Pick your pipe run from a drop down list, specify the interval and offset, calc coordinates, levels or polars to points along the pipe and print manhole detail sheets for the on site gang. Pipe details report on the drain diameters, the trench widths, lengths, gradients, traveller heights and dips from the peg top to the profile level.
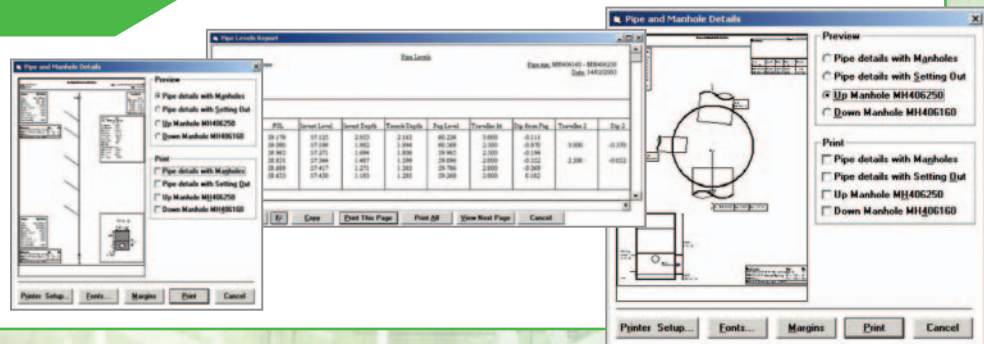
As Builts

Keep a track of your as builts by entering the information into the as built design. This keeps a separate record to the design containing all the as built information ready to compare to the tenders.

Produce long sections along pipe runs the vertical and horizontal scales being user specified.

Measure

Measures can be broken down into any category. Measure the design or the as built. Measuring against the as built provides a comparison to the tender scheme. Volume methods are fully customisable but as a default it complies with the MMHW Standard. Measure Pipe Runs, Manholes, Fin Drains, Channels, Connections, Headwalls and Revetments.

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Quarry Profiling & Wire Design

Quarry Profiling

Using the Modelling and Sections Modules, Quarry profiles can be displayed along with drill hole positions and directions so that maximum and minimum Overburdens are given as well as projected Areas and Volumes.

A survey of the existing quarry face can be sectioned and opened in the editor. Tell the system at which offset the drill collar will be placed and supply the angle and drill depth or drag the bottom of the drill hole to the required place. The new quarry face will be calculated and displayed on screen. The base of the drill hole is extrapolated at level to the quarry face. A minimum and maximum clearance are calculated and displayed along with a burden area.

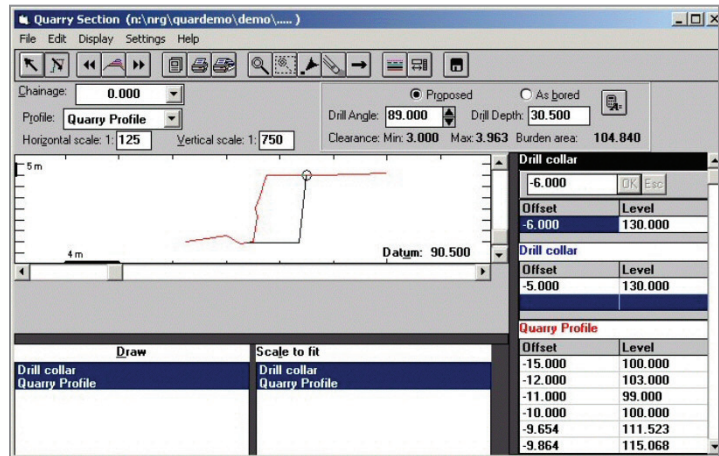Open the sectional file and you will see a secondary layer called drill collar has been created. It this drill collar layer enter the information regarding the top starting point of the drill hole. The angle and depth of drilling can be controlled via the respective boxes.

Any borehole information can also be plotted on the cross section showing the position and depth of the borehole. By plotting the boreholes the material types can be traced and the drill depth adjusted accordingly.

Controls are provided to toggle between proposed and as built bores.

Wire Design

Wire design has been developed to take the time consuming calculations out of creating an overhead wire layout. The Pole Positions can be imported either from an alignment string or a coordinate file. Positions being imported as chainage and offset.

The user can define the pantograph width and the stagger to suit individual needs. Along with cable sag (Kg/m), Tension (kN), Wind Speed (m/sec), Form Coefficient, Effective Cable diameter. Various stagger values can be input for varying degrees of curves or radiuses

The wire height and height to cantilever is input. The system will then check the wire design against the pylons taking into account the pantograph width and stagger, producing a report of any elements which do not fit the design parameters.

Analysis is possible for wire to pantograph between set chainages at a specified interval or at Mid Spans.
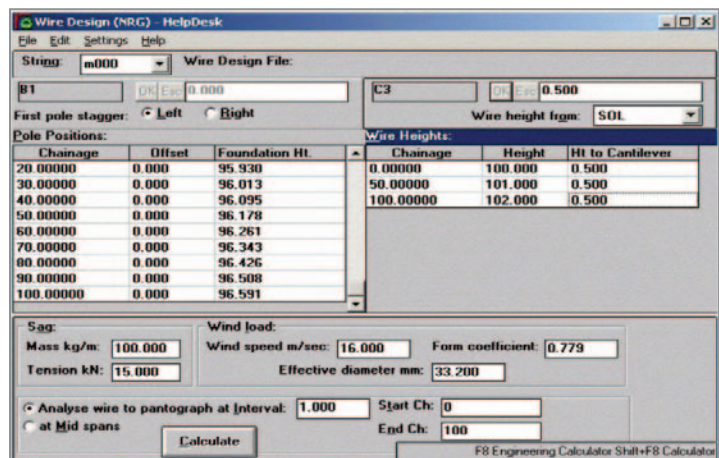
The Pylon positions can be exported to coordinates and the wire design to an alignment string. Any errors in the design will be reported as an offset difference from the expected position.

Reports show, foundation height, wire to pantograph distance, cantilever height above foundation, cantilever height above SOL, Cantilever Length, Easting, Northing, chainage and offset.

NRG - Practical solutions to technical problems

Geospatial Engineering Software

Level Book & Engineering Calculator

Level Book

- A super utility for reduction and adjustment of manual or electronic levelling.
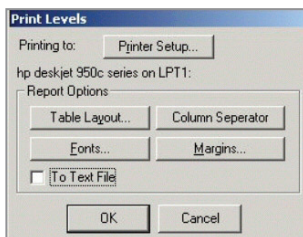
- Download level runs directly into Level Book, no more typing errors.

- Data can be imported and reduced from Zeiss, Sokkia or Leica digital Levels.

- Display the Level run and the Adjusted Run as separate colours.

- Store Multiple Runs on separate an easy to access pages.

- Calculate and Check any closure errors and apply automatic adjustments to each setup by supplying a start and end level.

- Automatic Calculation of reduced levels against design levels producing dips between the two.

- Fully customisable table layout and report options.
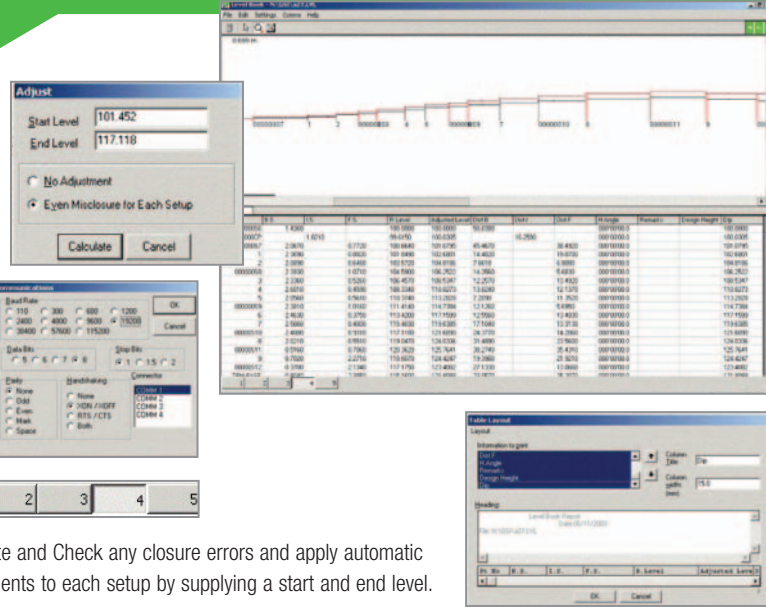
Engineering Calculator

Engineering Calculator with its various modules is an invaluable tool for virtually any engineering calculations. These include:

- Polar to Rectangular Conversions,
- Curve and Spiral Calculations,
- Linear and Cubic Interpolation,
- Scalene and Right angle triangles,
- DTM or Trapezoid Areas and Volumes,
- Traverses,
- Star Azimuths,
- Intersections,
- Resections,
- Curve fitting,
- There is even a function to make the tea!

All functions have a graphic interface to aid calculations showing what information to enter and where. The information displayed is dynamic, once enough has been input the answers are displayed ready to be copied to a spreadsheet.
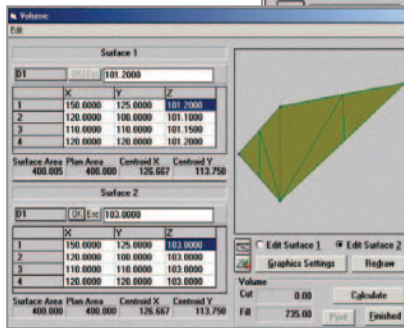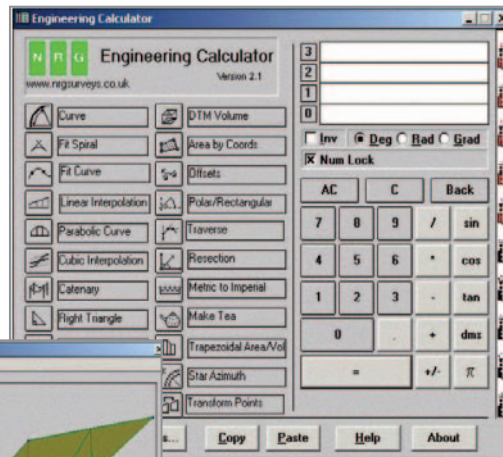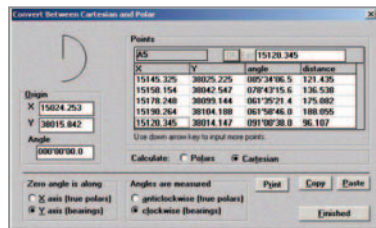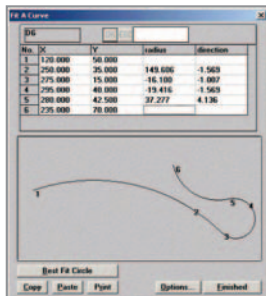
Curve Fitting – Simply enter the coordinates for each known point as soon as three have been entered the calculator will start to fit curves through the points. Enter further points and the transitions added and the curve continued.

DTM Volumes – Surface to surface volume measurement. Type in or paste from a survey file the coordinates and levels for each surface. A volume is calculated and displayed for the material between the surfaces.

Cartesian to Polar Conversions – Conversion Routines to reduce Rectangular to Polar Coordinates from a known point. Or visa versa.

Geospatial Engineering Software

NRG Training Courses

Module	Contents	Duration
Design 1	String data entry Manual data entry Extracting form MX	1 day
Design 2	Construction Details edge details road construction re-soiling	1 day
Setting Out	Psion setting out communication to PC setting out by chainage & offset setting out by co-ordinates profiles batter rails use of "compare" for setting out	4 days
Surveying	General data capture & feature codeing feature codes breaklines boundaries data collection editing surveys on PC	2 days
DTM / Map 1	Modelling & mapping triangulation breaklines & boundaries features & control codes contouring editing the model plotting & printing	2 days
DTM / Map 2	Final presentation annotation curve fitting plot orientation, scaling & tiling plotting / printing	2 days
Volumes 1	General Volumes volumes by isopachyte method volumes by cross sections	2 days
Volumes 2	Specialised Roadworks Volumes applying construction applying layers measuring ancilliaries printing, custom reports preparing schedule	4 days

Courses can be broken down further or customised to suit client requirements.

NRG Support

Technical support is provided on 3 Levels to suit your circumstances :-

No Support Contract

Your Licence will run forever and you can purchase updates at the cost per update. Support is still available over our Premium Line.

Support Contract

Your Licence will need renewing once a year protecting you from theft or loss. You will be eligible for free updates and any mainte-nance updates. Your email queries will also be answered within 4 hours of receipt. Telephone support is via our Premium Line.

VIP Support Contract

- As support but unlimited telephone support is available at normal UK rates.
- All new licences carry 3 months free support to get you started.

Prices and How to buy

Please see the seperate sheet within this brochure for a comprehensive list of NRG package prices.

- To purchase NRG Software or to discuss the possibilities contact us directly by email, telephone or fax -
  To email sales now: sales@nrgsurveys.co.uk

- We accept cheques or bankers drafts and offer credit subject to status.

- Feel Free to contact any of the above to discuss any queries or purchase options. We are always ready to help.

- We can advise you of the correct modules to meet your exact needs.

- Discounts are offered for multiple purchases.

- Prices are accurate at the time of printing

- Please contact for up to date price list

Practical Solutions for Technical Problems