12d Model

Surveyors and Contractors

12d Synergy Enabled

A comprehensive survey and civil construction solution.

The Future—Software Toolkit

12d Model is a standalone program developed by 12d Solutions to create a fast, stable, integrated 3D design environment and software toolkit for the civil engineering, surveying and construction industries.

Fast, **Flexible** and **Comprehensive**; 12d Model includes functions for surveying, digital terrain modelling, site grading, alignment design, stormwater modelling and analysis, visualisation, and design document and report generation.

12d Model is used by thousands of civil engineers, designers, surveyors, geoscientists and planners in over 65 countries worldwide.

Fast

12d Model has the power and speed to handle massive data sets with ease. It is used on a variety of very large, complex civil projects, comfortably processing large data sets and point clouds.

It is ready to use out of the box but also offers a large range of customisable features to suit your existing standards and business processes, further increasing efficiency.

Flexible

Although a standalone application, information can be moved seamlessly between other applications such as GIS databases, XP SWMM, HEC-RAS, Microsoft Office®, AutoCAD®, ArcView®, and MicroStation® using industry standard file formats such as DWG, DXF, Shape, DGN and LandXML.

By using the integrated solution of 12d Model, the office and field software are the same minimising user training and licensing costs.

Comprehensive

12d Model is used across a range of projects including road, rail, survey, tunnel and land development by small to large engineering consultancies, survey companies, contractors, municipalities and government departments.

Collaboration

The multi-user capability allows true team collaboration with real time data sharing. The synchronised multi-view working environment lets you view a project from every angle. Interface with Building Information Modelling (BIM) systems for full project life-cycle performance.

The Bottom Line

It is well known that good systems lead to great project and business outcomes. 12d Model provides fast, flexible and comprehensive tools that can be used across a range of projects and industries to achieve the solutions you need.

12d Field

12d Field has been developed to enable surveyors and engineers to use both GNSS and Total Stations with the same software that is used in the office to design and finalise projects.

12d Field gives Surveyors and Engineers the ability to use the full functionality of 12d Model on small daylight readable tablets and notebooks in the field.

Surveyors and engineers are able to view and control Motorised Total Stations from the Tablet PC or view live GNSS on screen position whilst surveying.

Survey data is displayed on-screen as soon as it is captured, with the necessary adjustments and visual styles applied.

12d Field communicates directly with survey grade GPS units and Total Station instruments. 12d Field connects to the instruments via:

As a comprehensive surveying and design suite, 12d Model is able to simultaneously display detailed design and existing data from a wide range of sources, ensuring total control and flexibility through 12d's interactive plan, section and perspective views.

This enhanced data flow in 12d Field adds to the existing power and functionality of 12d Model to create an invaluable tool for productivity and information management.

By providing the user with all the tools and information they need in the field, your survey and construction teams can be more productive with 12d Model.

12d Field has been developed in consultation with leading surveyors and engineers. Site needs have continually been added to the functionality of the product, providing a solution that has evolved from the industry itself.

12d Field was put through rigorous onsite testing to provide an internationally innovative solution as yet unmatched by competitor products.

12d Field has two modes: **Pickup** and **Setout**.

Pickup

12d Field Pickup provides the ultimate approach for surveyed data collection. The unique hierarchical attribute method with simple-to-manage coding, templating and live functionality gives the user complete control of the project and output, from the field.

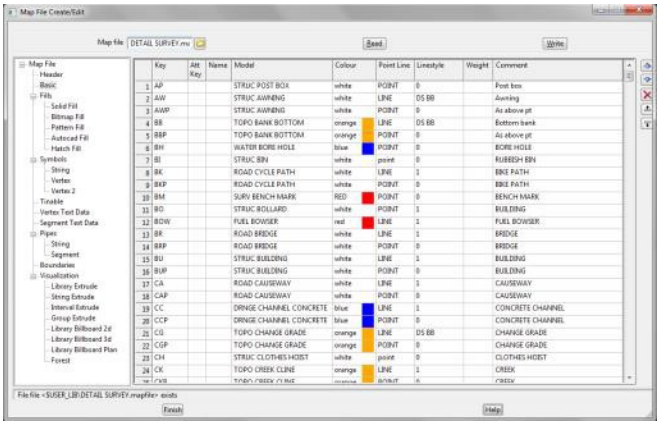
Setout

12d Field Setout has been developed to enable surveyors and engineers to set out construction projects using both GNSS and Total Station instruments.

A wide range of tools is available to the surveyor, allowing them to easily setout the various features and methods typically encountered in a construction project. These include point setout, string setout, batter setout, tin setout, grid setout, tunnel setout, and crossfall setout.

Survey Instrument Interface

Setout points, triangulations, centre lines, alignments and design cross sections can be created, exported or uploaded directly to survey instruments.



12d Model provides seamless data exchange formats for most survey instruments. Leica DBX and Trimble job files are created and read directly from within 12d Model.

Survey Data Reduction

Raw data from survey instruments is downloaded directly by 12d Model or imported and converted to 12d Model's 'Field File', ready for reduction.

During reduction, a mapping file can be used to apply line styles and symbols, colours and line weights, and to separate the data into models, all based on your field coding.

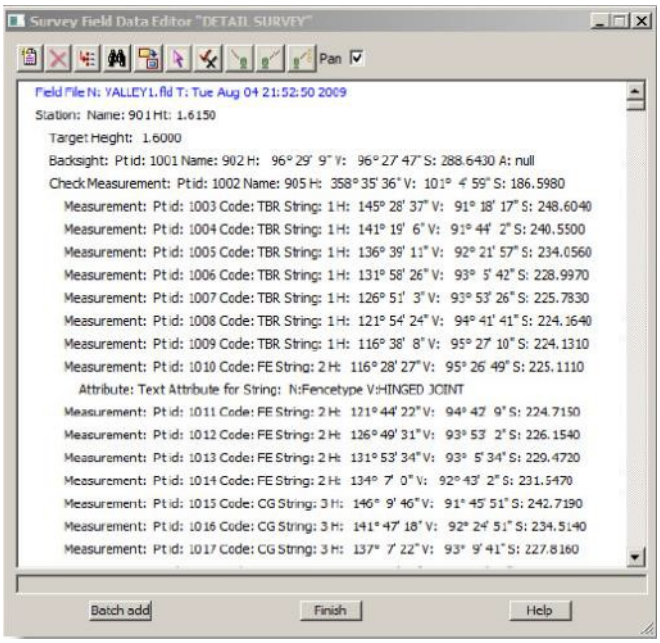
Field data is automatically joined into strings of common features ('strung') with full feature attributes based on field codes, allowing dramatic increases in field productivity for string-based surveys. Field pickup includes arcs, pipes and culverts. Coding by field templates is supported.

Corrections to field data such as miscoding or misnumbering of strings are managed on screen using 12d's enhanced field file editor. The user can select observations from the field file or on-screen, insert new codes or revert previous changes, ensuring the original data is always available.

All edits and modifications in the Field File are recorded, providing an audit trail for quality assurance purposes and to retain data integrity.

12d Model includes both solar and star reductions without requiring almanac details.

Geodetic calculations include interactive reporting of longitude and latitude, easting and northing, projection bearing and distance, and ellipsoid distance. Full geodetic calculations are available in reduction.



Traverse Spreadsheets

Plane and projection traverse spreadsheets exist for entering cadastral work by either using the keyboard or selecting from the screen. Data entered at the keyboard is immediately displayed on the screen. Sophisticated traverse spreadsheet drafting eliminates most, if not all, manual drafting.

Line work is automatically drawn in grid (Easting and Northing) co-ordinates but is labelled with observed bearings and distances with user defined rounding to suit most authorities. Adjustments include Bowditch, compass, transit and least squares. There is no limit on the number of traverse spreadsheets that can be created and reedited.

In the Lot Check option, existing plan dimensions are entered and used to check area calculations as well as ensuring lots are closed to prescribed limits.

Transformations

Zone to Zone and general conversions between Latitude/Longitude and Universal Transverse Mercator (UTM) projections, Transverse Mercator and most other projections.

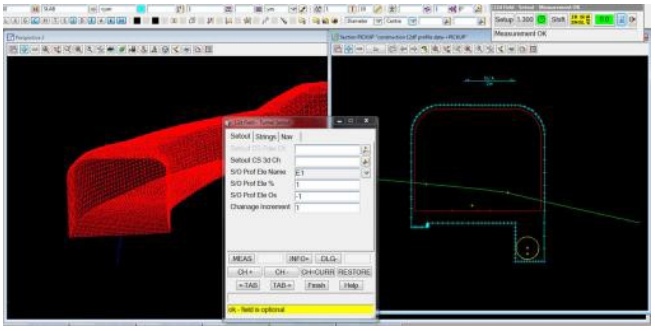
Transformations include affine, ortho-affine, 2D

Helmert, 3D Helmert, seven parameters and NTv2 Grids.

Elevation (height) adjustments including a simple constant, user defined planes or difference surfaces.

Tunnels

The tunnel functionality allows you to develop and manage multiple user-defined tunnel profiles of the

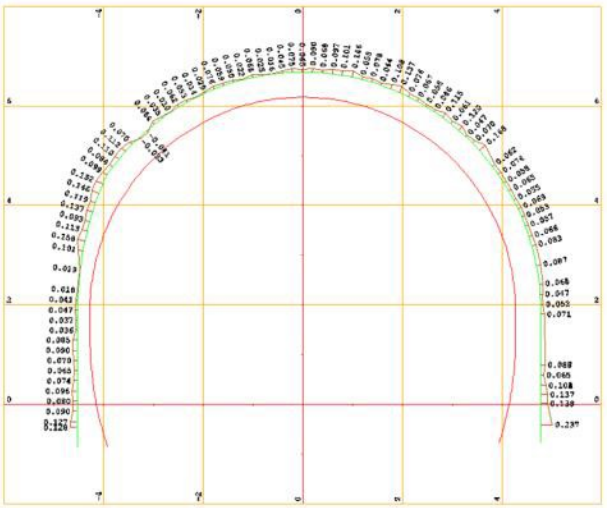


excavated surface and the design surface. Tunnels can be created normal to alignments or vertically using both plan and true, 3d chainages.

The resulting tunnel strings can be used to create a ‘tri-mesh’ surface of the tunnel. This can be visualised and coupled with 12d Field, used to set out and check conformance during construction of the tunnel. Conformance reports and plots can be created to document design versus constructed design.

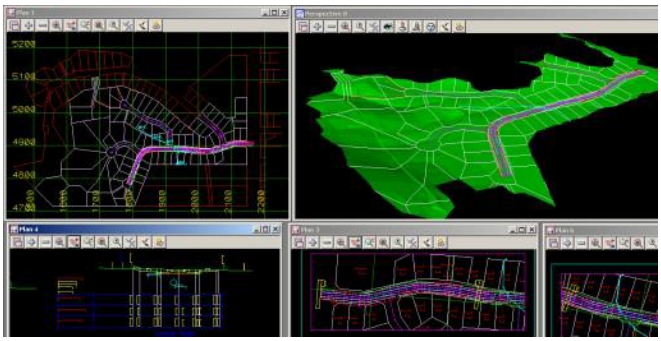
Conformance reporting

Transverse reports are available to ensure all surveys are traceable and easy to manage. For construction surveyors full conformance reporting options are available to providing position, both in x,y,z and chainage offset modes, highlighting existing vs design difference with in or out of tolerance values.



Estate Lots

House lots are created for residential developments by a variety of methods including parallel, perpendicular and swinging sides. Minimum frontages and areas can be preserved. Existing lots can be subdivided. Arcs can be subdivided by chords or tangents according to either number, length or an arc-to-chord tolerance.



Lots are numbered and can be given user defined types such as lot, park or road. Lot labelling includes areas, numbers, types, labelling the side of lots with bearings and distances (with user defined rounding), and creating short segment tables for lines and/or arcs. Lot reports include areas sorted by lot number, lot type, or area. Lots can be

coloured by area. Functions exist to create point numbers and reports for setting out the lots.

Machine Automation Data

With increased use of machine control equipment in construction, 12d Model has continuously improved output formats to suit major manufacturers. This negates the need for surveyors to double handle data for machine control.

Point Clouds

Point cloud data can be downloaded from instruments or imported into 12d Model for viewing and/or future use in the design process.

Drafting and Reporting

Plans, profiles and cross section sheets can be generated automatically allowing for the quick and easy production of drawings and documentation.

Outputs can be plotted or exported to CAD using one of the many templates provided with 12d Model or can be entirely customised to suit your existing drawing and reporting standards.

Terrain Modelling and Stock Piles

3D surfaces are easily created allowing the development of contours, profiles, colour shading and reporting of volumes. Imagery can be draped onto TINs to create a realistic representation of existing or future conditions.

Cut and fill volumes can also be quickly calculated between any two surfaces or between a surface and a height and in many other ways. Multiple surfaces can be quickly and easily merged together using the proprietary SuperTIN tool which ensures your merged surfaces are always up-to-date.

Integrated CAD Functionality

An integrated CAD engine is available for complete drafting functionality. There is no need to interface with other CAD systems to output drawings or information.

However, if required, 12d Model can still be integrated into your existing CAD workflow and data exported to the major CAD packages. Plot outputs can be customised to match your project or company requirements, significantly reducing drafting time.

Design Automation

12d Model has the ability to link commands to automate the design processes. This saves time as well as improving efficiency and consistency of repetitive tasks. This is particularly useful when creating and plotting plans, long and cross sections, creating output to other programs or resolving and recalculating design tasks such as alignments and surfaces.

No programming experience is required; simple to create and use, once created, they can be used across multiple projects.

12d Model for Surveyors and Contractors

Import from TIF,TGA,PNG, JPG, GIF, ECW, DIB, BMP, DDF, MIF, HGT, LAS, Land XML, PTS, TR, MOS, CRD, GEN, INP, MS Excel, DXF, DWG, DGN, DEM, ASCII, SHP, TXT, DAT, SUR, 12DA, 4DA.	✓
Export to IFC, KML, PTS, TAB, Land XML, MOS, MS Excel, DXF, DWG, DGN, GRD, DEM, ASCII, SHP, TXT, 12DA, 4DA.	✓
Interface directly with all major survey equipment manufacturers	✓
Set out file creation	✓
Survey data reduction and checking	✓
12d Field Setout options: Single String, Batter, Tin, Crossfall, Point, Grid, Tunnel	✓
Subdivision/Parcel/Estate design and set out functionality	✓
Geodetics, Conversions and adjustments—All survey systems supported	✓
Stockpile Calculation & Reporting – volumes and surface area calculations.	✓
Conformance—Tunnels, batters, pavements, etc.	✓
Cogo functionality	✓
Point cloud processing & viewing	✓
CAD—wide range of drafting functions.	✓
Reports—Custom reports for volumes, conformance, quality, etc.	✓
Multi-Plot—automated creation of plan, profile and cross section sheets.	✓
Multi-view—Plan, profile and perspective windows to view design fro all angles	✓
Multi-user—Unlimited number of users working with the same data	✓
Design Automation—tools to automate repetitive tasks and instantly recalculate design elements	✓
Custom commands—flexible programming language to create custom commands for your business	✓
Interface with 12d Synergy	✓

Roads and Highways

12d Model's design option is the smarter solution for the design, modification and maintenance of Road and Highway projects.

Enjoy advanced 3D tools to design local and major roads, intersections, roundabouts, highways, interchanges and much more.

Ports and Dredging

12d Model is the solution for port infrastructure and dredging, easily managing the very large datasets and complex volume calculations often required by these projects.

A complete range of flexible and customisable volume calculation tools allow teams to extract and present the information quickly and easily.

Land Development

12d Model is the most versatile solution for the creation of sustainable land development projects, including residential, commercial and industrial developments, recreational areas, landfills, and agriculture projects.

Easily manage all aspects of your land development project from earthwork quantities, road design utilities and drainage design.

Airport Infrastructure

12d Model provides a solution for the design, construction and analysis of new airports, as well as the upgrade and maintenance of existing runways and airport infrastructure.

Easily manage large airport infrastructure projects and share data across multi-disciplinary teams.

Rail

12d Track has been specifically designed for the survey, design and construction of light, heavy and high speed rail projects.

Extensive railway tools in 12d Track allow the rail designer to quickly and easily design their projects. These options are built on the existing 3D modelling and design tools available in 12d Model.

Mining Infrastructure

12d Model's powerful set of exploration, site investigation, survey and analysis tools are crucial for the initial design, construction and ongoing operation of mining projects.

Comprehensive tools for the survey, design and construction of access roads, railways, earthworks and services allow for the coordinated design and management of mining infrastructure from within 12d Model.

Drainage, Sewer and Utilities

12d Model provides comprehensive tools for the design, analysis and optimisation of stormwater and sewer projects using rational, dynamic (hydrograph) and 2d drainage methods.

Powerful clash detection management allows for efficient 3D modelling of service networks such as gas, electricity, telecommunications and water prior to construction.

Surveying

12d Model is a complete surveying package providing the tools to manage all facets of surveyed data including LIDAR, topographical, as-built, conformance, traversing, geodetics, data mapping, labelling and much more.

The 12d Field option runs on a ruggedized tablet and gives the user access to full 12d Model functionality, allowing you to take the entire project into the field with the most comprehensive pick-up and set-out tools.

Oil and Gas

12d Model assists with the design, construction and mapping of oil and gas pipelines, original site exploration and the wide range of infrastructure required for oil and gas projects.

Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.

Construction

12d Model is the ultimate software for construction with powerful set-out options, direct interfaces to machine control and detailed conformance reporting and auditing.

Manage 3D data and control volumes, quantities and progress claims with 12d Model. Set-out your project and undertake conformance and as-built surveys live on-site using 12d Field.

Rivers, Dams and Hydrology

12d Model handles very large datasets and interfaces with a wide range of analysis packages, making it perfect for flood studies and the management of rivers and dams.

12d has partnered with industry leading analysis software, allowing users to apply 2D drainage analysis from within 12d Model.

Environmental

12d Model's ability to handle very large datasets combined with flexible and comprehensive 3D analysis and modeling tools make it perfect for a wide variety of environmental projects.

Existing workflows can adopt 12d Model easily as it allows users to directly interface with GIS systems and most software packages and file formats.

Why Choose 12d?

- **Powerful data processing & intelligent functionality.**
- **Modular, easy to update & completely customisable.**
- **Seamless integration with major industry software and hardware.**
- **Used in over 55 countries worldwide.**
- **Friendly support & training from industry experts.**

AMERICAS: Vancouver
E ben.crawford@12d.com
P +1 206 905 1464

AUSTRALASIA: Sydney
E sales@12d.com
P +61 2 9970 7117

EUROPE: London
E sales@12d.co.uk

P +44 (0) 845 051 0372
(Sales & Support)

12d Solutions Pty Ltd PO Box 351
Narrabeen NSW 2101 Australia

12d Model