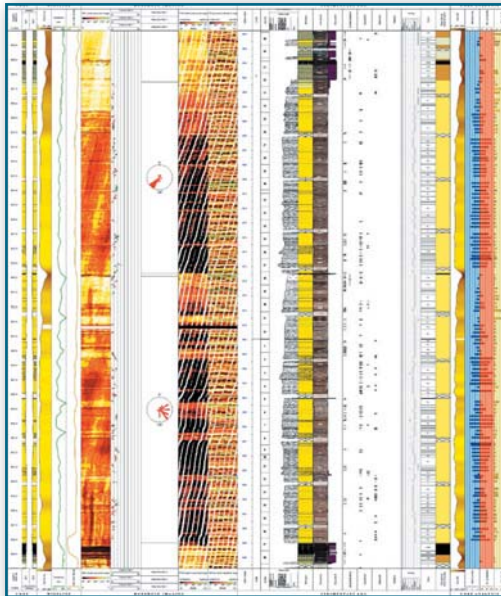




- BASIC**
- ▶ MULTWELL
 - ▶ ODBC CONNECTOR
 - ▶ IMAGE PROCESSING
 - ▶ FULL WAVE PROCESSING
 - ▶ DEVIATION
 - ▶ CORECAD-WELLSITE

WellCAD®

The composite log package

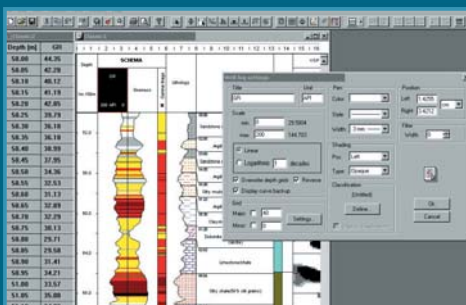


Wells are a tangible knowledge asset in the Geoscience Industry. WellCAD allows you to integrate all data acquired in a well in a single document. This native 32-bit windows PC based software combines excellent display, editing and analysis capabilities for well data. WellCAD basic is the central application of the software package. A number of add-on modules can be activated to meet user specific requirements. The software is delivered with a set of templates, headers, dictionaries customised for specific application. You can of course easily modify existing ones or create your own.

Data import/export

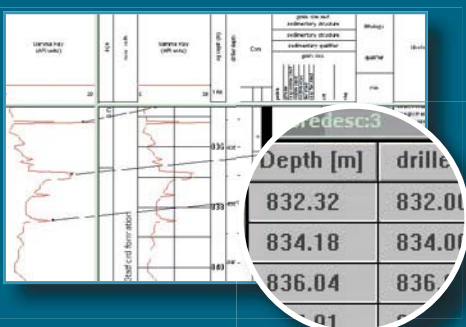
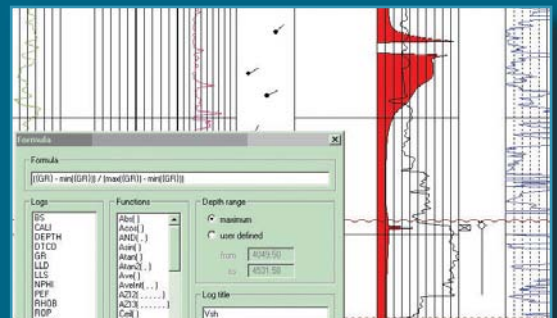
- ASCII, CSV, TXT files, LAS,
- Bitmap files (*.bmp, *.tif),
- LIS, DLIS, SEG-Y, SEG2,
- Many 3rd party proprietary files...
- Open SQL based relational database support

WellCAD basic



Data presentation

- ▶ User defined template and header
- ▶ User controled log settings (grid, colour...)
- ▶ All data are numerical and can be edited in a separate spreadsheet view (tabular editor)
- ▶ Unlimited options for data display (colour, style, width...)



Depth management

WellCAD provides a multiple depth management (time, depth, TVD). The depth-matching tool allows you to fine tune your data (e.g calibrate core description data to the wire line logs.) All correlations will be saved in a new depth log helping you to assess the match.

Curve editing, computations, user programming

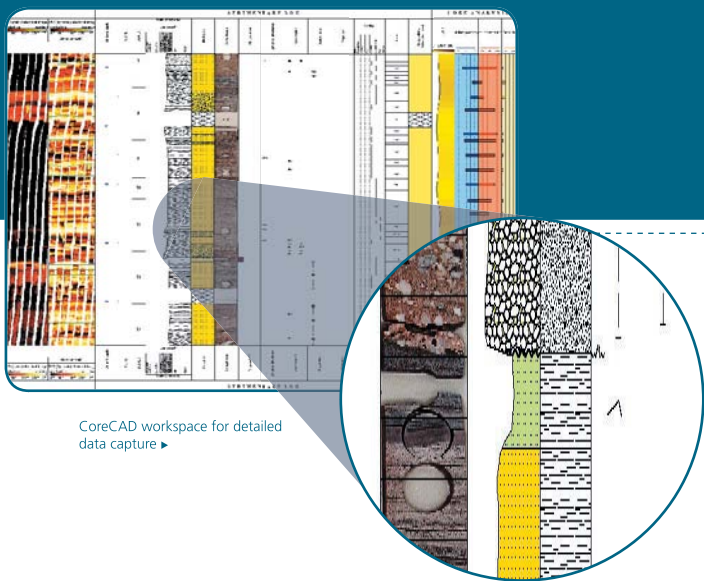
- ▶ Options to slice, shift, merge, resample, filter curves
- ▶ Formula parser (curve calculator with multiple discriminators)
- ▶ Calculation of Northing, Easting, TVD, Dog leg severity, closure distance and closure angle
- ▶ Specific processing (cement calculation)
- ▶ Quick look analysis
- ▶ Basic cross plot

You may also add your own process routine and specialised task using OLE automation with VB, VBS, VBA (batch processing, auto lithology builder).

CoreCAD

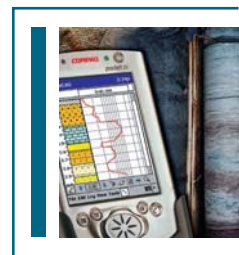
The module provides the geologist with a set of tools to quickly capture geological information. It may be used to create lithology logs at the wellsite, capture cuttings lithology or produce a very detailed digital coredescription chart in a coreshed.

The CoreCAD view allows displaying the core photographs next to the geological parameter logged. The workspace includes various snaps and zoom options for quality control while acquiring the data. Any parameters that can be expressed numerically in terms of depth and value may be captured. This includes lithology (clastic/carbonate) with sedimentary surfaces, sedimentary structures (major and minor), fossils, ichnofossils, bioturbations, mineralisation, qualifiers, grains size /texture (coarsening and refining up sequences), sorting/roundness, stain, porosity, rock color, post depositional feature, facies/environment...

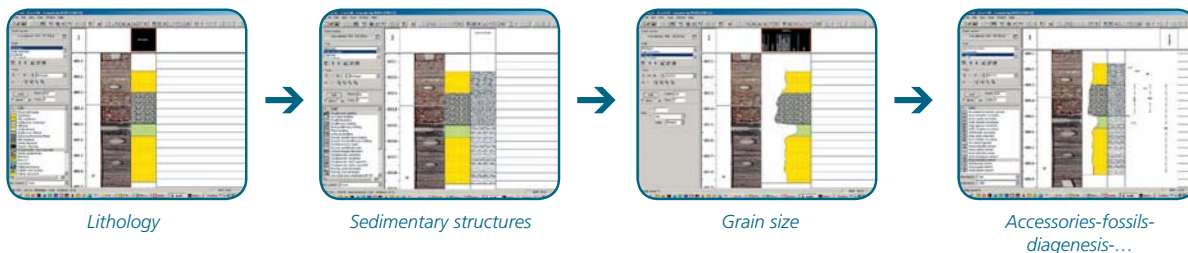


CoreCAD workspace for detailed data capture

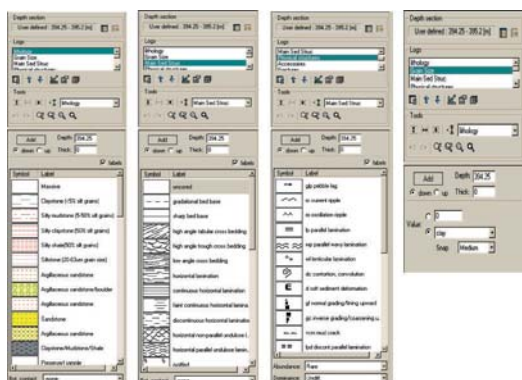
The CoreCAD workspace provides an interactive environment to describe user defined depth intervals (e.g. boxes or outcrops) in detail. Final core description chart is updated real time with data acquired in CoreCAD.



CoreCAD for PDA



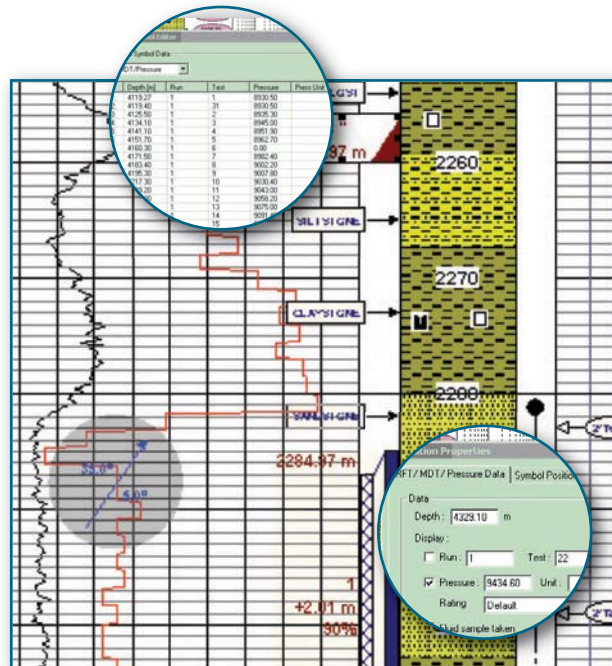
Core description workflow, symbol libraries can be customized to meet the reservoir specific requirements and the sedimentologist's ways of working.



Each parameter is described in its own workspace. All necessary data management and workspace layout control are combined in a tool bar. The toolbar content adapts automatically to the parameter being described.

Wellsite

Engineering data can be inserted either interactively on the document or using the build-in symbols editor. The data may be displayed in the document and/or in a spreadsheet section in the document header. The data are handled using specific display and settings (Plugs , Bit Data , Casing Data, Date marker, Orientation Data, Production liner, Drill Stem Test, RFT/MDT/Pressure, Conventional and sidewall cores, Mud parameters, shows)



Borehole image analysis

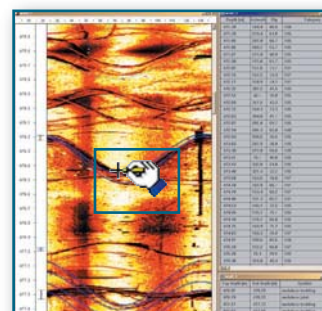
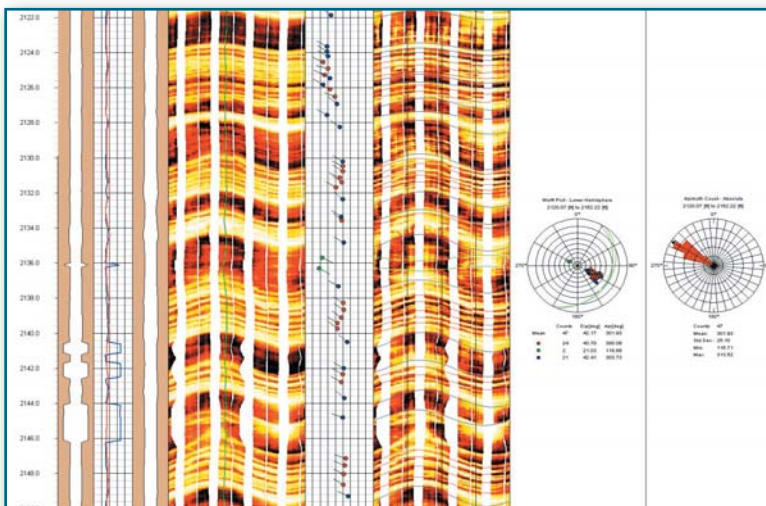
Data import

Borehole-image data from a variety of tools including acoustic televiewer, optical televiewer, co-scanned images, FMI, FMS, CAST, CBIL, UBI, STAR and Sondex MIT are supported. For data available in LIS/DLIS format files, you will have to use the LIS/DLIS add-on module.

Data processing

Before any form of analysis is performed, the data needs to be processed. This involves the creation of a reliable high quality image from raw tool measurements. A number of processing options are available for enhancing the quality of the data. These includes

- ▶ Bad trace interpolation
- ▶ Image normalization
- ▶ Despiking filters
- ▶ Recentralize image
- ▶ Adjust brightness and contrast (for RGB logs)

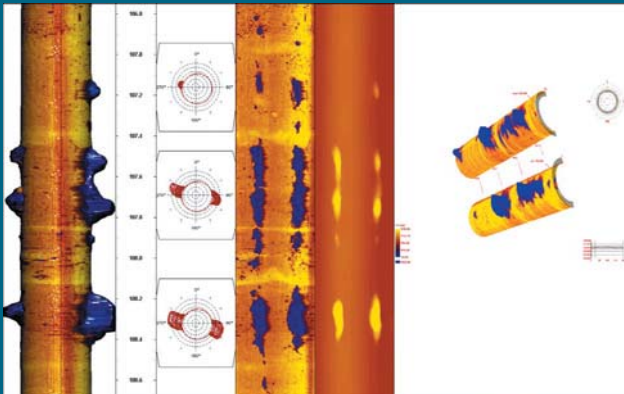


Interactive structure/
Fracture picking

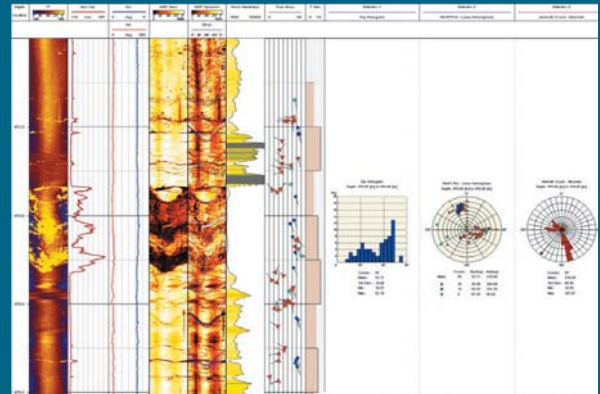
Data interpretation

Any number of sinus curves can be interactively picked recording azimuth and dip values. Each pick can be qualified into user definable categories (ToadCAD). Picks can be displayed as sinus, tadpole or stick plot.

Fully interactive structure interpretation including polar and rose diagram (stereonet analysis). The modules includes specific process such as, caliper calculation from travelttime images, extraction of curves indicating rock strength, reflectivity from images.



Acoustic televiewer breakout measurement



Fracture characterisation and orientation

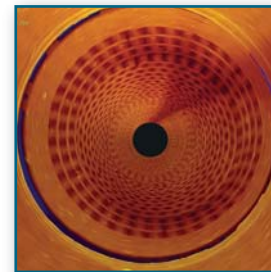
Data presentation

Data can be displayed as an image (user definable image color palette), as curves (shifted or stacked curves) or as 3D cylinder display (mimic a virtual core).

Data can be visualised as 3D images using 3D borehole view (ideal to visualise breakouts, well deformation, pipe corrosion).

Data can be oriented to North or Highside, or rotated by a user defined input (magnetic North to true North correction).

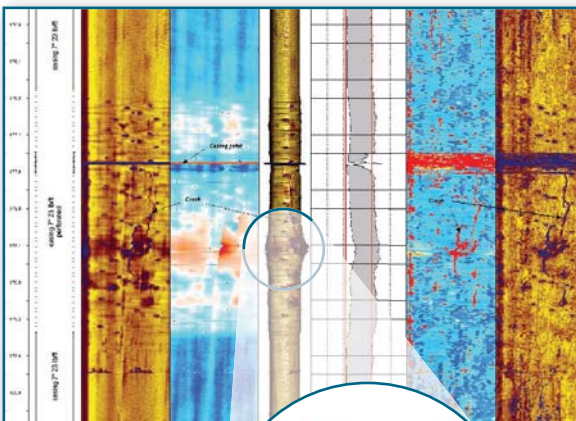
- ▶ intuitive user interface
- ▶ Help buttons and on line manual
- ▶ All settings are stored with the document template
- ▶ Flexibility
- ▶ Parameter settings preview



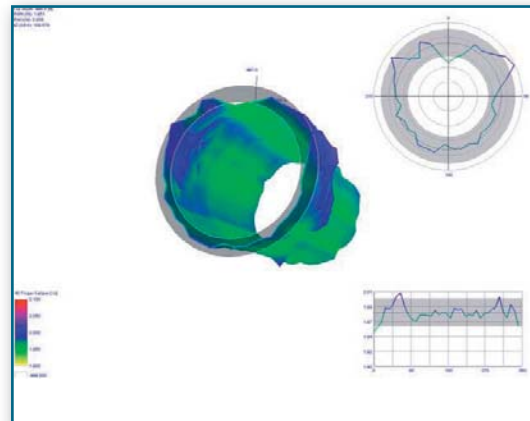
Corrosion evaluation

Mapping distribution, configuration, orientation and severity of corrosion through the entire borehole. (Thorough or detailed analysis) WellCAD 3D data virtual borehole reality can help to identify internal deposits, localize pipe deformity or pipe buckling.

The software includes specific process such as metal loss calculation for multi-arm calliper



Example of casing damaged over the perforated interval during the blasting information.



Full wave form sonic

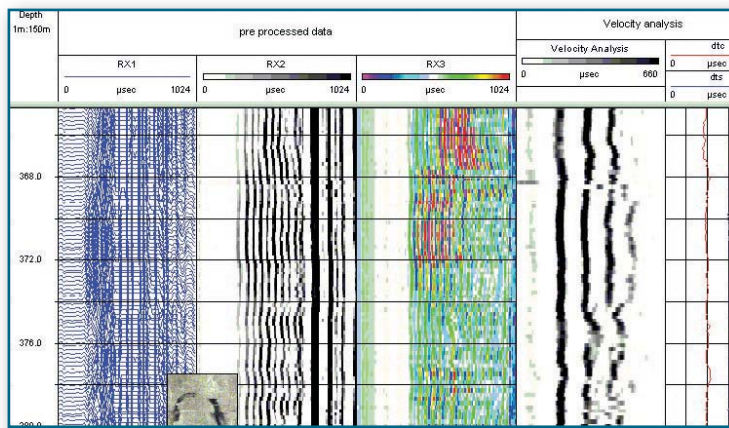
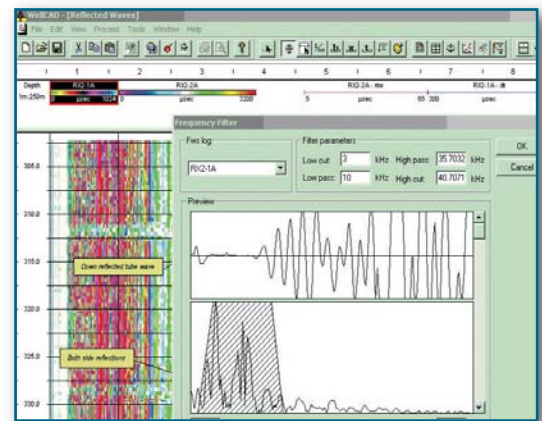
The FWS module includes a set of processing techniques to interpret sonic data. The software provides full control of the process by allowing the user to define the parameters

Preprocessing

A range of preprocessing techniques are provided to get optimized data prior to applying the relevant process. Filtering can be applied using moving average, weighted average or frequency. For improved results, these filters can be combined. In some cases, it might be useful to interpolate bad traces prior to filtering.

DT Picking

WellCAD allows different algorithms for dt pick up. The standard threshold algorithm returns the transit time at the first amplitude value greater or equal to the specified threshold value, found after the blanking window. The advanced threshold process computes the ratio of the average value of signal and noise windows. The user may define the values for blanking, small window width, large window width and ratio threshold.

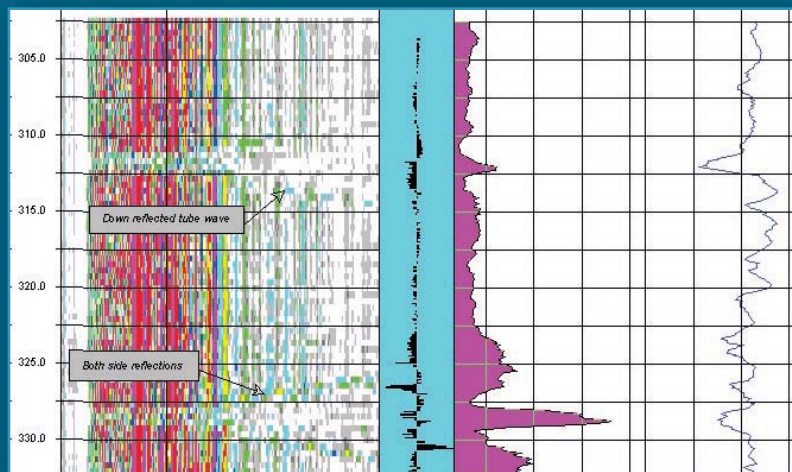


Velocity analysis

The velocity analysis based on semblance processing can be used to derive p-, s- and tube wave velocities.

Mechanical properties computation

Sonic logs are widely used to provide formation porosity/permeability and mechanical properties. If dt compressional, dt shear and Rhob are known, WellCAD computes for each depth mechanical properties of the rocks: Poisson ratio, shear Modulus, Young's modulus, Bulk modulus, Bulk Compressibility.



Reflected Tube wave analysis

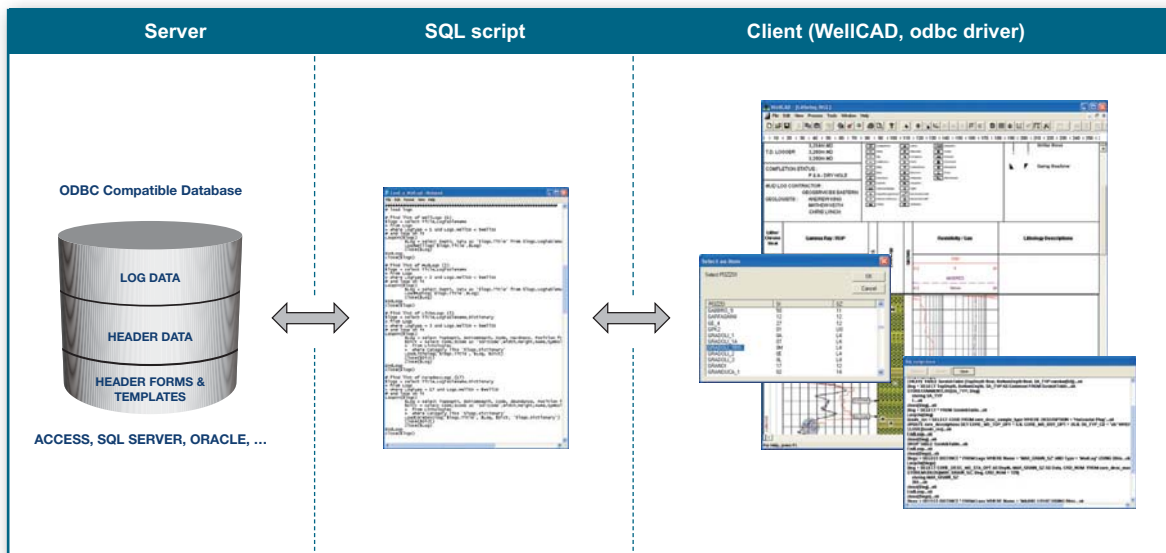
The tube wave may be seen as indicator of fracture. Prior to computation, the offset, blanking, transmitter frequency and the fluid velocity have to be defined. The process returns a curve. The value of each depth is the cumulative energy computed over a V shaped area in the late time area of the FWS log. The higher amplitude could be seen as indicator of fracture (fluid velocity defining the slope and the transmitter frequency the width).

Cement bond logging (CBL)

Standard algorithm for cement bond quality evaluation are available (e.g. fixed and floating gate method).

Odbc connector

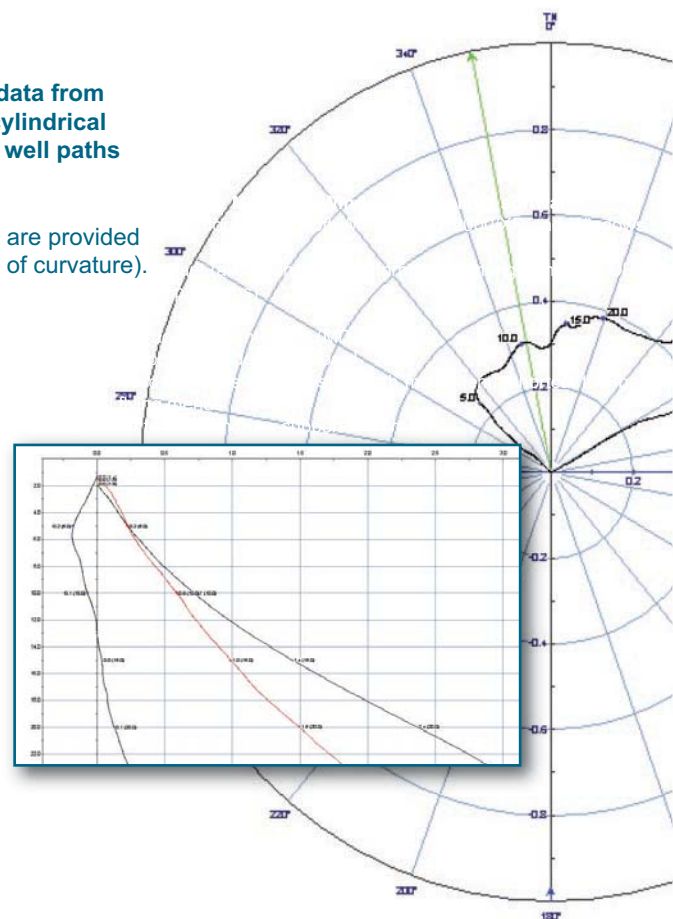
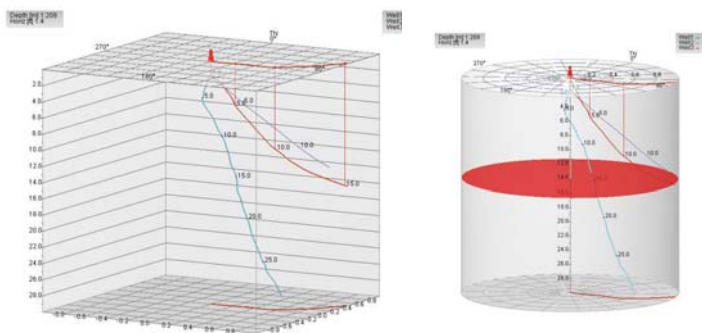
With the odbc module activated, WellCAD may loads or saves data from/to an odbc compatible database. WellCAD includes its own SQL*interpreter and provides various SQL commands which allow communication with any open SQL-based relational database. The user can compile SQL commands and scripts to create, load, save and modify record sets.



Deviation data display

The module includes various 2D and 3D display options for deviation data from classical bull's eye, projection and closure 2D views to 3D cubic and cylindrical displays. Each view comes with its own settings and options. Multiple well paths and target layers can be displayed.

The methods for computing x,y,z coordinates from borehole azimuth and tilt are provided in the WellCAD basic process (classic tangential, balance tangential, radius of curvature).



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The specifications are not contractual and are subject to modification without notice.