

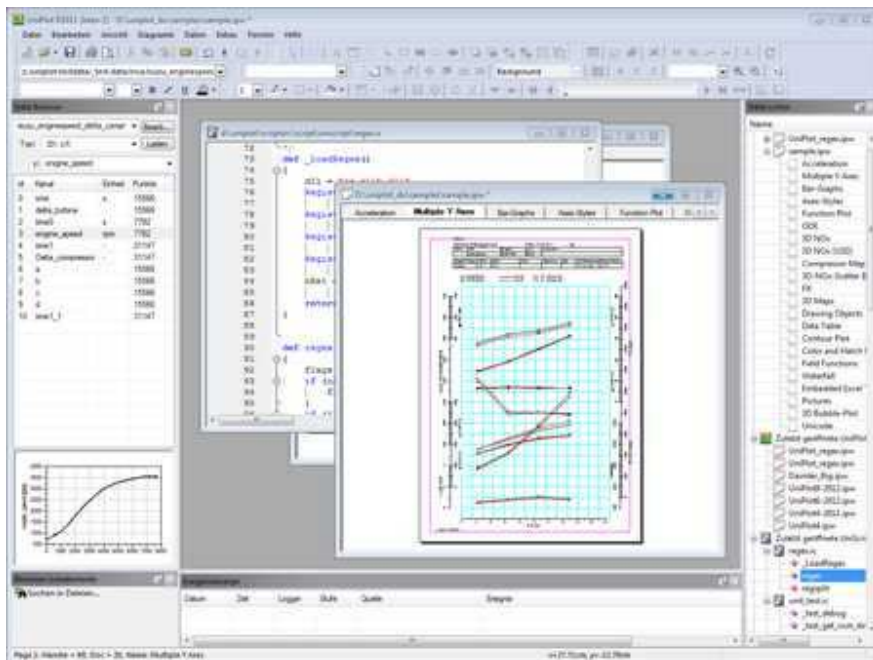
UniPlot Data Evaluation

Overview

A&D in partnership with UniPlot provides an A&D standard version of UniPlot that works with A&D tools including iTest, Orion, Phoenix/CAS, ADX/Procyon and iCentral.

UniPlot is the A&D solution for data evaluation including:

- Reports
- Interactive analysis
- Mining data from the iCentral server



UniPlot is a powerful tool that enables you to visualize and analyze test data. With only a few mouse clicks, you can transform your data into 3D surface maps with color zones, contour maps with color fill, or plot 2D data into diagrams with several axes. Text objects, scanned photos and other drawing and labeling elements can be easily inserted into the document.

Data can be processed interactively or automated for repetitive tasks or analysis.

UniPlot offers an efficient and powerful programming language. It enables the user to add new functions to the user interface, to execute complex mathematical data analysis, to import specially formatted data files or to automatically produce complete documents.

Diagrams

UniPlot allows any number of diagrams on one page and any number of datasets in one diagram.

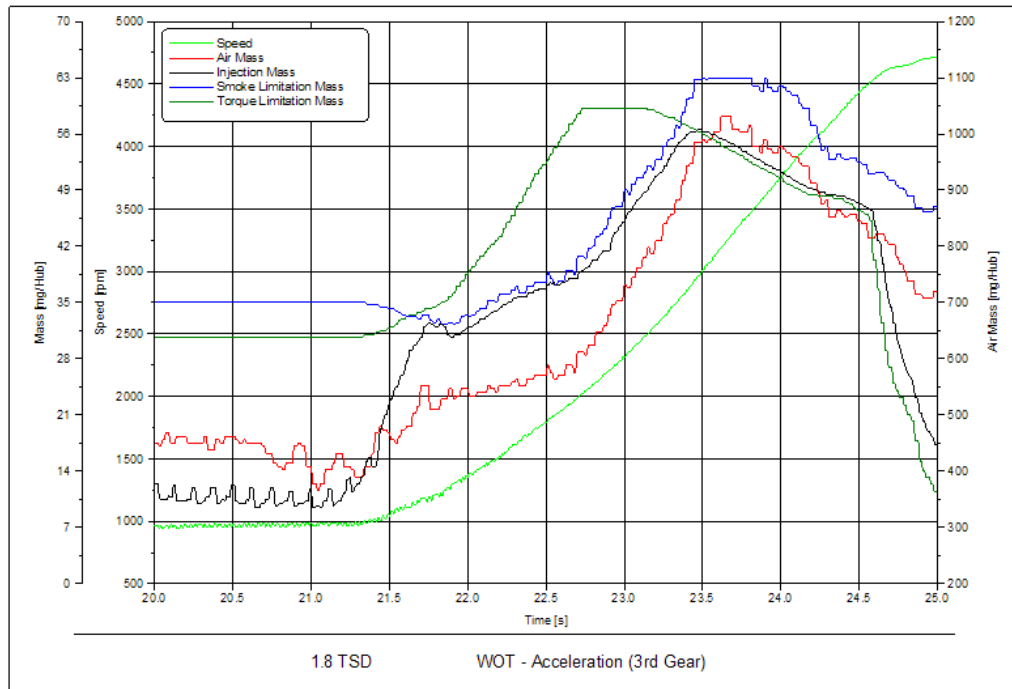
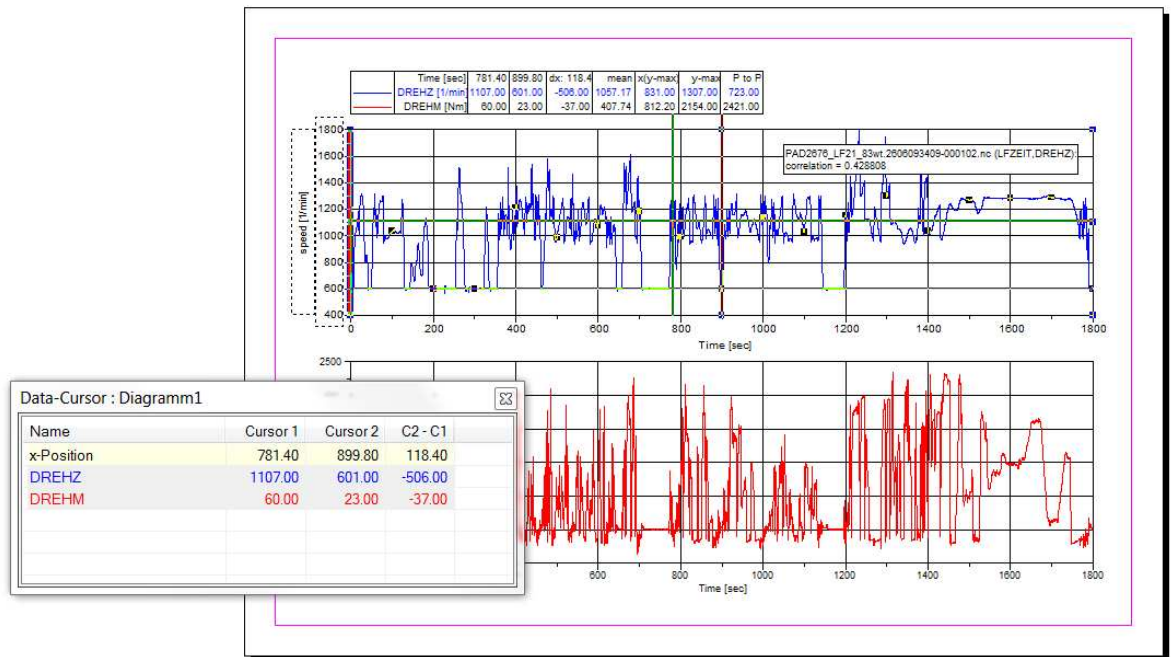


Diagram functionality includes:

- Diagrams with one or more x- and y-axis
- Diagram size and position can be specified in centimeters with true scaling, e.g. 1 centimeter equals 20Nm
- Axes can be scaled ascending and descending
- Extensive settings for gridlines, tick marks and axis titles and labels
- Automatically or manually scaled axes
- Date/Time axes scaling
- Log axes scaling
- Square axes scaling
- Use text for tick labels
- Polar diagram
- Waterfall diagram

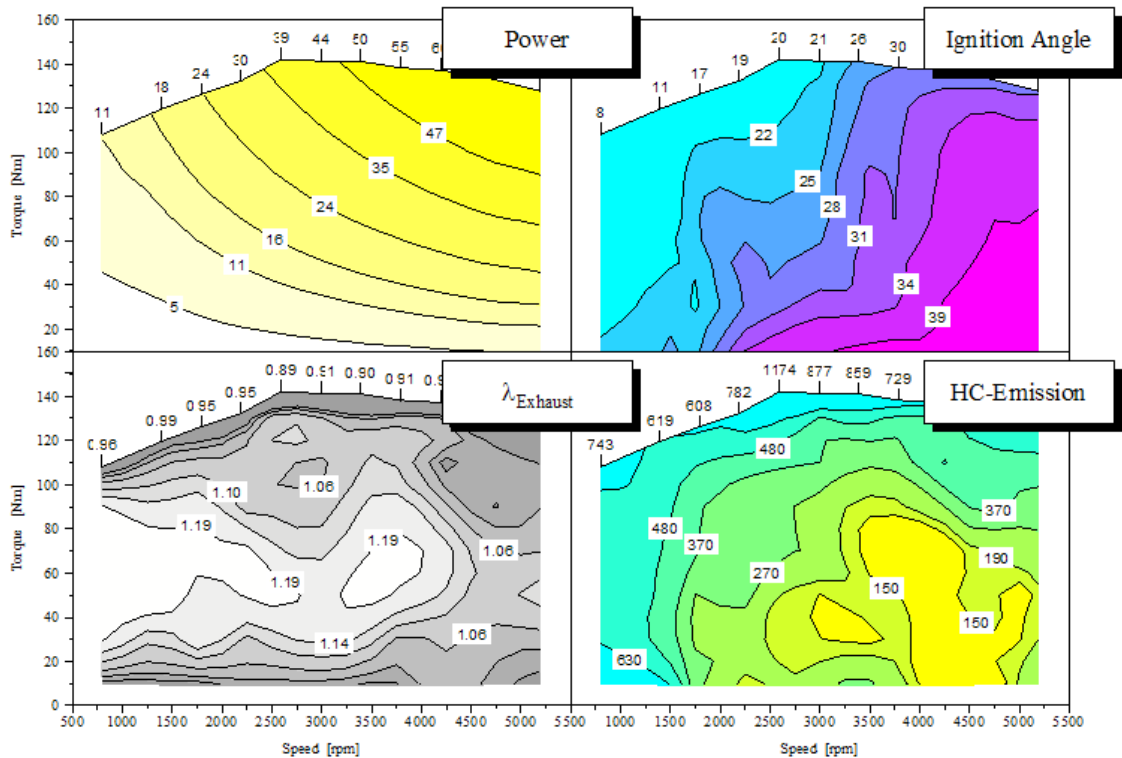


2D Line Plots

2D line plot functionality includes:

- Mark data points with symbols and drop lines
- Connect points with straight or curved lines (spline, smoothing, regression or nonlinear curve fitting)
- Dash-Dotted lines with adjustable line thicknesses and user defined patterns
- Color and hatch filling underneath a curve
- Area between curves can be color and hatch filled
- Adjustable hatchline distance, line thickness and color
- Horizontal order vertical bar graphs
- Automatic creation of editable legends
- Upper and lower hull curve
- Data smoothing to reduce signal noise
- Linear or logarithmic axis scaling
- Datapoints can be labeled
- Data cursor

Contour Maps



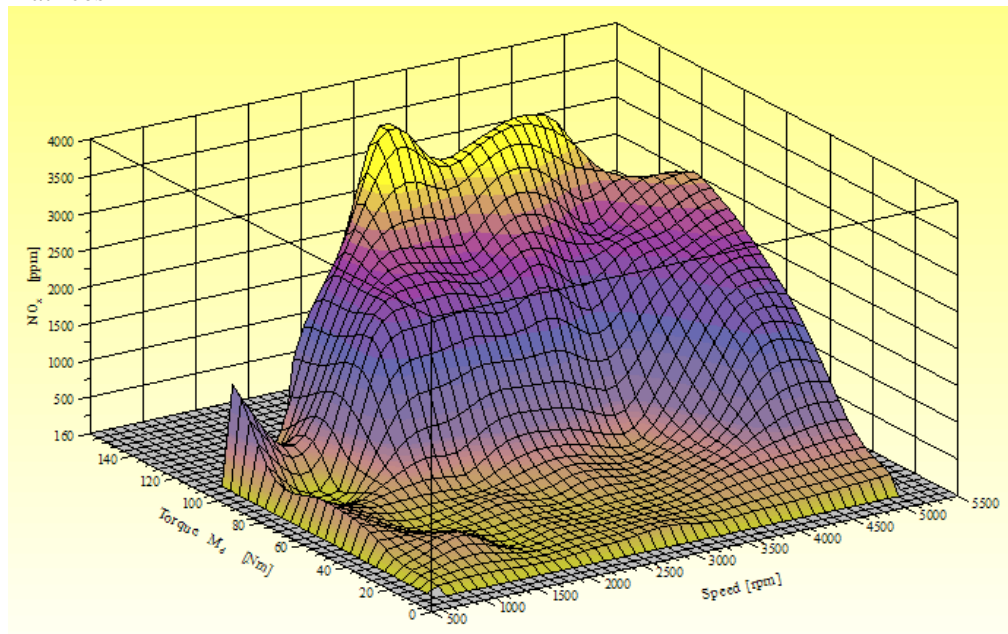
Contour map functionality includes:

- Automatic or manual distribution of isolines (z-levels)
- Insertion or deletion of isolines and labels with one mouse click
- Set line style (type, width, color) for one or more isolines or for a range of isolines
- Color fill between isolines
- Color scale bar
- Adjustment of isoline labels to the isoline gradient. These can be plotted with a frame and in the same color as the isolines.
- Calculation of isoline areas
- Cross section of contour maps for $x=\text{const}$, $y=\text{const}$ or along any curve
- WOT curves can be used as a data hull. Points of the WOT curve can be labeled.
- The contour map data hull can be freely defined. The hull can contain islands.
- Splines for isolines and WOT curve
- Any number of 2D and 3D datasets can be plotted in one x/y diagram (i.e. power and consumption maps)
- The data can be drawn as a scatter plot. Extreme values (minimum and maximum) can be marked.
- Linear, non-linear and Thin Plate Spline gridding methods and data smoothing

3D Surface Maps

UniPlot provides the ability to create 3D surface maps including the following functionality:

- Mesh plots with or without hidden line removal
- Surface mesh can be clipped at the data hull, set to "0" outside the hull or extrapolated to the edge of the diagram
- 3D surface grid lines correspond to the axis division marks
- Draw isolines on surface
- Orthographic or perspective projection
- Bilinear or spline interpolation to change the number of columns and rows of matrices



Drawing Objects

- Draw lines, arrows, rectangles and ellipses
- Multi-line text objects with centered, right or left justification
- Grouping drawing objects to a single unit
- Send to back, send to front, drag and resize, copy, cut, and align drawing objects
- Adjustable element attributes: color fill (solid or gradient), shadow, size, position, round edges etc.
- Adjustable snap to grid for easy mouse editing
- Protect objects from accidental mouse changes
- Insert pictures (JPG, BMP, GIF, PNG, BMZ, EMF, EMZ, WMF, WMZ)
- OLE server and container. Insert UniPlot diagrams into other Windows applications or insert graphics, tables, text etc. into UniPlot documents
- If LaTeX is installed it can be used to insert formula text

Data Handling

UniPlot provides a fast data browser with up to 10000 channels. Rows only limited by file size limit of your Windows system. Each channel is limited to 2.1 billion data points. Data handling functionality includes:

- Channels can have different data types (4 and 8 byte float, 8-, 16- and 32-Bit integer, date/time. Strings)
- "Missing-Values"
- Filter, sort channels
- Add, Transform channels using the formula interpreter
- Insert/delete/edit of global attributes or channel attributes
- Delete channels or rows
- Freeze columns
- Create Excel reports
- The Browser can be extended by user defined functions.
- Import ASCII- or Microsoft-Excel (incl. Excel 2007), VS100/INCA-, dBase-, Lotus-, FEVIS-, Combi-, IFILE-, netCDF-, MATLAB and other Data formats. New filters can be added using the build in language UniScript Data base access e.g. via ADO or DAO.
- Import time signals (1D data)
- Import x/y data curves (2D data)
- Import irregularly distributed 3D data
- Import equidistantly distributed matrix data
- Import non-equidistantly distributed matrix data
- Import hull data
- Export interpolated matrix data
- Export hull data
- ASAM-ODS database (RPC and Corba)

UniScript Programming Language

UniScript is a matrix orientated interpreter with a C-like syntax that allows you to add new functions to UniPlot and includes the following functionality:

- Automates repetitive tasks
- Analyses and transform data
- Functions to alter menus and to create dialog boxes. Dialog boxes can contain text, edit fields, list boxes, combo boxes, and check boxes.
- Trigonometric, sort, search, read and write (ASCII, Excel, binary) functions
- Linear algebra (inverse, eigenvalues, determinants etc. - these functions build on BLAS/LAPACK/LINPACK routines)
- FFT and iFFT
- Systems of ordinary differential equations
- Fitting splines

- Non-linear regression
- Complex numbers: most of the operators and mathematical functions can be applied for complex numbers
- Strings: string vectors and matrices, concatenate, compare, search and replace, sort
- Flow control: for, while, break, continue, return, if-then-else, try-except
- UniPlot has approximately a thousand functions. New functions can be defined by user.
- DLL's (dynamic linking) written in C, C++ or other languages can be loaded to UniPlot
- UniScript has access to all documents, data sets, diagrams, drawing objects, menus, and editors belonging to UniPlot
- UniPlot is an ActiveX Server and ActiveX Client
- UniPlot is an OLE Server
- Source code debugger
- Editor with syntax highlighting
- UniScript can be used as a stand alone program

OPTION: Emission Evaluation with UniPlot

UniPlot also allows for Emission test cycle evaluation. The following test cycles are supported:

- WHTC
- WHSC
- ETC
- ELR
- ESC
- NRTC NSTC
- JE05
- User defined Steady State Test Cycle with any number of modes
- User defined transient tests

The screenshot shows the 'Emission Test Cycle Evaluation' dialog box. It contains the following fields and options:

- Configuration:** WHSC-GLD2676 (dropdown), with buttons for New..., Delete..., and Open Directory.
- Data File:** U:\data\X12_23_20110317.nc (text field), with buttons for ... and Edit....
- Data File cold:** (text field), with buttons for ... and Edit....
- Buttons:** Data Channels..., Gas-Response Time...
- Template:** Z:\projects\emission\etc_template1.ipw (text field), with a button for
- Test Cycle:** WHTC (dropdown), Euro VI (dropdown), and Cycle Section Definition... (button).
- Fuel:** Diesel (dropdown), Fuel Composition... (button).
- Reduce Work by Cooling Fan Work (Name, p3, p2, p1, p0)
- Cooling Fan Polynom:** (text field), with an Edit... button.
- Particulate Pollutants (PM) measurement:**
 - Calculate Particulate Mass
 - Mf:** 0 mg Particulate sample mass collected
 - Gedf:** 0 kg/test Equivalent diluted exhaust gas mass flow rate
 - Msam:** 0 kg/test Mass diluted exhaust sample passed through filter
 - T:** 0 °C Temperature before Filter
- NOx-Measurement hot
- Certification Test (Invalid data points (missing_value) are not allowed.)
- Turbocharged engines with or without cooling of the intake air
- Engine data for point deletions from regression analysis:**
 - Idle Speed:** 600 1/min **Rated Speed:** 0 1/min
 - Max. Torque:** 0 Nm **at Speed :** 0 1/min
 - Idle Torque:** 40 Nm

Buttons: OK, Cancel

Validation statistics of the test cycle include:

- Data shift
- Permitted point deletions from regression analysis
- Cycle Work
- Regression line tolerances
- Standard error
- Coefficient of determination

