



vSignalalyzer

Product information

Table of contents

1	Overview	3
1.1	Introduction	3
1.2	The advantages at a glance	3
1.3	Areas of application.....	4
1.4	Function extension through additional options	4
1.5	Using CANape with vSignalizer license in analysis mode.....	4
1.6	System requirements.....	4
1.7	Further information	4
2	Functions.....	4
3	Visualization and manual evaluation of measurement data	5
4	Extended evaluation by functions and virtual signals.....	7
5	E-mobility analysis in the high-voltage network	8
6	Automated evaluation of measurement data and data mining	8
6.1	With scripts for easy automation	8
6.2	Evaluation and analysis of multiple measurement files.....	9
7	Report generation	11
8	Supported measurement data formats.....	12
9	Analysis of recorded bus communication	12
10	Visualizing the vehicle position on a map	13
10.1	Areas of application.....	14
11	Evaluating data recorded with loggers.....	14
12	Development of driver assistance systems.....	15
13	Measurement data management with vMDM	16
14	Visualization of thermodynamic measurement data	17
15	Engineering services.....	18
16	Trainings.....	18

1 Overview

1.1 Introduction

vSignalizer is the convenient tool for efficient evaluation and analysis of all kinds of measurement data. It offers measurement engineers extensive data visualization options as well as functions for manual and automated analysis and report generation.

The measurement data recorded during the acquisition of physical quantities as well as during network development, analysis and ECU application can be read in from different file formats. Extensive function libraries and the integrated data mining function allow your measurement data to be evaluated manually or automatically and conveniently displayed with a focus on the essentials. Powerful print and report tools are integrated to document the results. The visualization of GPS data with various map materials is already included in the standard functional scope.

The "Driver Assistance" option adds a verification solution for driver assistance systems (ADAS) to the vSignalizer.

1.2 The advantages at a glance

- > Convenient and individually customizable display of recorded measurement data
- > Efficient handling even with very large measurement files
- > Direct coupling between vSignalizer and vMDM (Vector Measurement Data Management) for easy access to centrally managed measurement data
- > Automated analysis of arbitrary data sets according to specific criteria with the data mining functions
- > Indexing of MDF files on the workstation computer for fast and convenient search of measurement data
- > Extensive mathematical function library for creating data analyses
- > Creation of own functions for individual extension of the analysis; integration of MATLAB/Simulink models
- > Meaningful reports and documentation of analysis results



Bild 1: Convenient display and evaluation of measurement data with vSignalizer

1.3 Fields of application

With vSignalizer, you focus on the measurement data that is relevant to you. You simply create panel interfaces to control the analysis process and visualize your measurement results. Even extensive analysis functions and data mining calculations can be started with a few mouse clicks and run completely automatically. This enables even less experienced users to perform complex analyses with vSignalizer. Due to the high degree of automation, you also easily evaluate several very large measurement files, e.g. overnight.

vSignalizer offers you extensive tools to easily and quickly insert the measurement results into your report or to print them directly. The adjustable print view allows you to take a look at the later document already during the evaluation. Drag-and-drop functions make it easy for you to insert the results into external tools such as Word or PowerPoint.

A wide variety of data formats from the field of measurement technology, vehicle and ECU development are supported. You can load several measurement files in parallel to compare them with each other, to store measurement signals together in a new measurement file or simply to extract and save the data and time ranges that are relevant to you. vSignalizer is optimized to work quickly and target-oriented even with very large measurement files. vSignalizer helps you to effectively and individually evaluate the measurement data generated by data loggers, measurement and calibration systems, test benches or analog measurement modules.

1.4 Functional expansion through additional options

- > Driver Assistance" option for object verification of driver assistance systems and optimization of image processing algorithms
- > Option "Thermodynamic State Charts" for visualization of thermodynamic state diagrams

1.5 Using CANape with vSignalizer license in analysis mode

If you use CANape for measurement data acquisition but do not have access to your CANape license at all times (e.g. the license is permanently installed in the vehicle), you can operate CANape in Analysis Mode with your vSignalizer license. This mode allows full access to all analysis functionalities. Switching between Analysis Mode and full CANape functionality is done smoothly without restarting the program.

1.6 System requirements

Component	Recommendation	Minimum
Processor	Intel Core i5 3.0 GHz or higher	Intel Core 2 Duo 2.6 GHz
Memory (RAM)	16 GB (special tasks may place higher demands on the system. Please contact vSignalizer support if required).	8 GB
Hard disk space	≥ 2.0 GB (depending on options used and operating system components required)	
Screen resolution	1920 x 1080 or higher	1024 x 768
Graphics card	DirectX 9.0c or higher	
Operating system	Windows 7 (SP1) / 8.1 / 10 Note: Only 64-bit versions are supported	

1.7 Further information

Various documents are available on the Internet for vSignalizer. With the demo version, you receive sample configurations for the various application areas as well as a detailed online help, in which all functions of vSignalizer are described. Furthermore, you benefit from valuable know-how in the form of technical articles and application notes. You can find more information in the [Vector Download Center](#).

2 Functions

vSignalizer provides you with all the functions for examining, comparing and editing measurement data:

- > Visualization and evaluation of measurement data

- > Fast evaluation and assessment of large amounts of data through automation
- > Report generation with PDF output and export to Office applications
- > Import and export of measurement files of all common formats
- > Analysis of the recorded CAN, CAN-FD, LIN, FlexRay and Ethernet bus communication
- > Time-synchronous display of sensor data as superimposed objects in the video image with the "Driver Assistance" option
- > Time-synchronous display of measured values and the corresponding vehicle position on a map
- > Common project management with the CANape measurement and calibration tool and the vMeasure exp measurement software

3 Visualization and manual evaluation of measurement data

In vSignalizer, signals with different scales and physical meanings can be displayed. The mixed display of analog and digital signals in different sub-windows of the graphics window allows, for example, the direct comparison of switch states and resulting system reactions. A zoom process over the time axis leads to a uniform resolution of all partial axes.

vSignalizer displays signals both over time and in an XY display over another signal. The global measurement cursor provides you with a tool that allows you to directly compare signal values of all display windows at the same time. The measurement cursor is always placed at the same temporal position in all display windows. The corresponding values or image sequences for the current position of the global measurement cursor are also displayed in the text, trace and multimedia windows. You can also synchronize the time axes in all windows and display pages. Furthermore, difference cursors, grid lines, various Y-axis display options, labeling options, zoom functions and much more are available for fast and effective evaluation. Color functions support the evaluation by overlaying the signal values with further information, e.g. for highlighting limit violations or the combined display of two signals.

By drag-and-drop you insert statistic columns for all measuring signals into the windows. In addition to the name of the displayed signal, you are free to show additional columns in the legend, e.g. signal information or statistics values.

For comparison purposes, you can visualize signals from several measurement files simultaneously. Directly from the graphics window, the displayed signals can be saved in a new measurement file of any format. The time range to be saved can be set individually. Of course, you can also evaluate statistical data measured with CANalyzer/CANoe, such as bus utilization, message rates and error rates.

The same window can be displayed on several display pages at different positions. In addition, windows can be displayed outside the vSignalizer main window, so that their display is independent of the active display page. In the data window you can comfortably visualize all properties of the measured variables. The display of structured signals is also realized in this window.

The selection of the signals to be displayed is done by drag-and-drop from the Symbol Explorer. In addition to displaying MDF metadata such as project, user name, etc. in the Symbol Explorer, you also visualize the signal properties to simplify the selection of measurement data. The search function can be used across all measurement data.

With the event-based signal comparison, you can very quickly and conveniently compare signal characteristics at different points in time within a measurement, for example, to detect outliers or deviations from the target behavior. You easily specify the points in time via the signal value comment function, or you use trigger events or data mining hits.

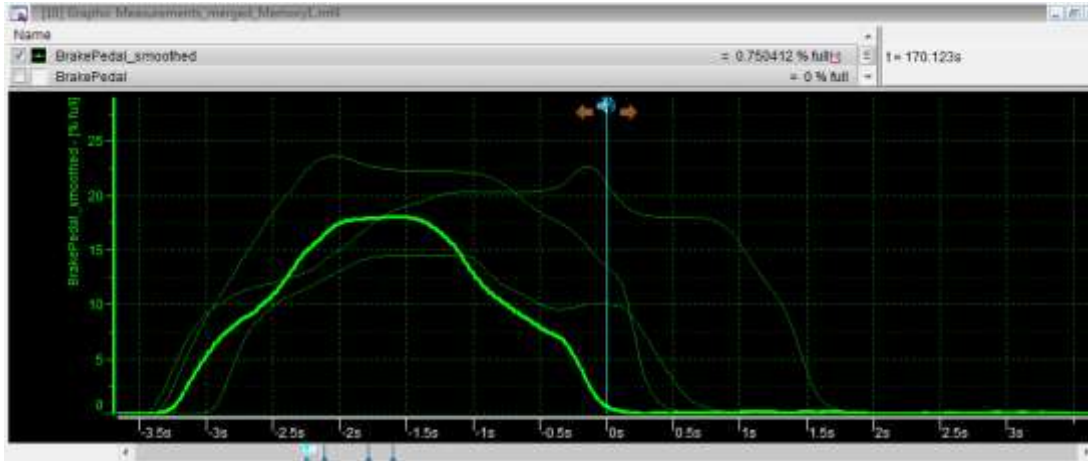


Bild 2: Comparison of a signal curve at different points in time

To compare signal curves of different measurements, simply drag the respective measurement files into the graph window. The desired signals are displayed for several files in color shades on a common axis. Time differences between the individual files can be easily corrected using the time offset function.

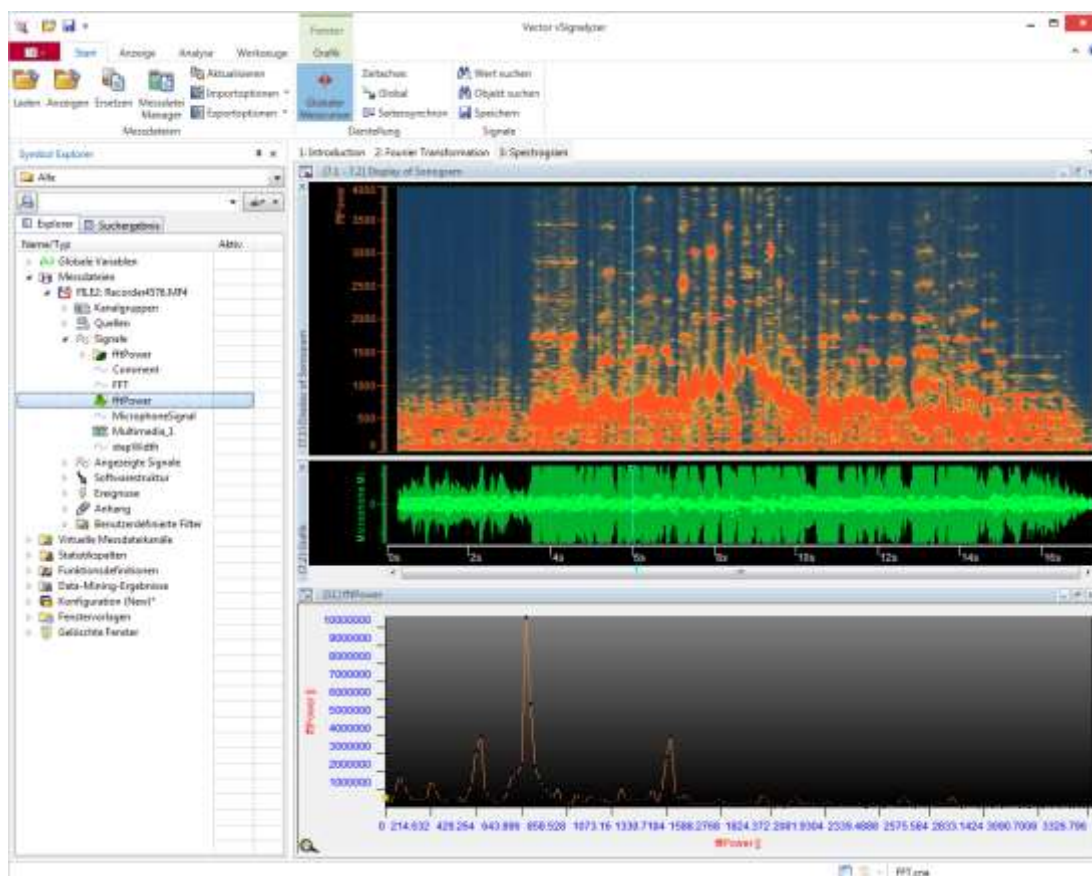


Bild 3: With the spectrogram display - in this example of an audio source - you visualize the power spectrum of a signal.

The most important functions in detail:

- > Import and export of different measurement file formats
- > Easy handling of the measurement files, e.g. loading of several measurement files, clear display of the contained signals
- > Signal display over time or in XY representation

- > Manual analysis of signal curves using zoom, search function and cursor
- > Synchronous movement of measurement and difference cursor across all display windows
- > Envelope display in the graphics window shows the signal curve with all outliers with simultaneous acceleration of the loading process
- > Numerical, graphical and spectrogram displays of recorded characteristics and fields including operating point
- > Superimposition of signal curves and maps with further information by means of color functions
- > Common display of measurement data recorded with different time rasters
- > Time-synchronous display of signal progressions and video sequences
- > Comparison of signal curves within one measurement file or between several measurement files
- > Flexible setting of the axis display in the graphics windows
- > Display of statistical quantities directly in display windows as a separate column
- > Free commenting of signal points and areas; comments appear in the graphics window and on the printout and are saved in the MDF file
- > Exporting sequences from measurement files including synchronous video editing
- > Display of the data structure of measured ECU signals

4 Advanced evaluation through functions and virtual signals

To analyze the measurement data, you can apply any evaluation algorithms to your measurement data using functions already available in the library or functions you have created yourself. The result of the functions is available as a virtual signal and can be displayed like a real signal in the display windows or used again as an input variable for further functions. To calculate the virtual signals, the functions and their input signals can be integrated into the display windows simply by dragging and dropping them from the Symbol Explorer. Filter functions such as the moving average are realized via indexed access to signal values of different sampling times. The output of intermediate results or status information in the Write window considerably facilitates the development of the calculation functions for the virtual signals.

To simplify the creation of your own functions, the function editor provides you with a specially adapted working environment. With this editor, you create and compile the functions and, if required, also integrate them into the library. To facilitate access to individual signals and functionalities of vSignalizer, CASL (Calculation and Scripting Language), a C-code-like, easy-to-learn scripting language, is available. It also allows the developer to integrate his own C code or Simulink models.

To create virtual measurement signals, MATLAB/Simulink models can be included in addition to functions, or the graphical editor can be used. With the editor you create simple functions with a few mouse clicks.

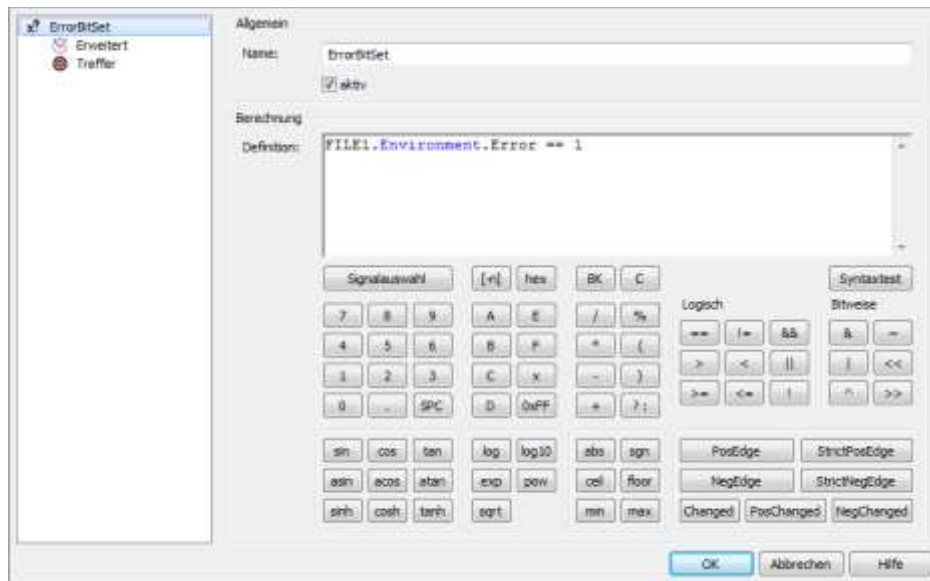


Bild 4: Easily create virtual functions with the graphical editor

5 E-mobility analysis in the high-voltage network

The integrated function library eMobilityAnalyzer forms the core of scalable analysis solutions in the high-voltage environment. The relevant characteristics of the drive, the HV components or the vehicle electrical system are calculated from voltage and current signals acquired at a sampling rate of up to 1 MHz. Among other things, you can precisely calculate the efficiency, the effective, apparent and reactive powers.

6 Automated evaluation of measurement data and data mining

With large amounts of data, as they occur in vehicle development, a purely manual evaluation is often no longer possible. With powerful functions, scripts as well as the data mining functionality, vSignalalyzer enables efficient evaluation of measurement data even with large data volumes.

6.1 With scripts for easy automation

With the help of scripts, you can quickly insert automatisms. Whether you always want to automatically align the graphics window to new measurement files or automate entire test sequences - both are possible with scripts. In the function editor you create and compile the scripts quickly and easily, just like functions.

The execution of scripts is done manually or linked to specific events, such as loading a new measurement file, starting or closing the project, etc. The Task Manager provides you with an interface that allows you to manage and overview the linking of your scripts to events.

To make working with functions and scripts easier, define global variables. These can be used within functions and scripts. Via adjust windows or panels you have the possibility to assign values to the variables, to change them or to adjust them.

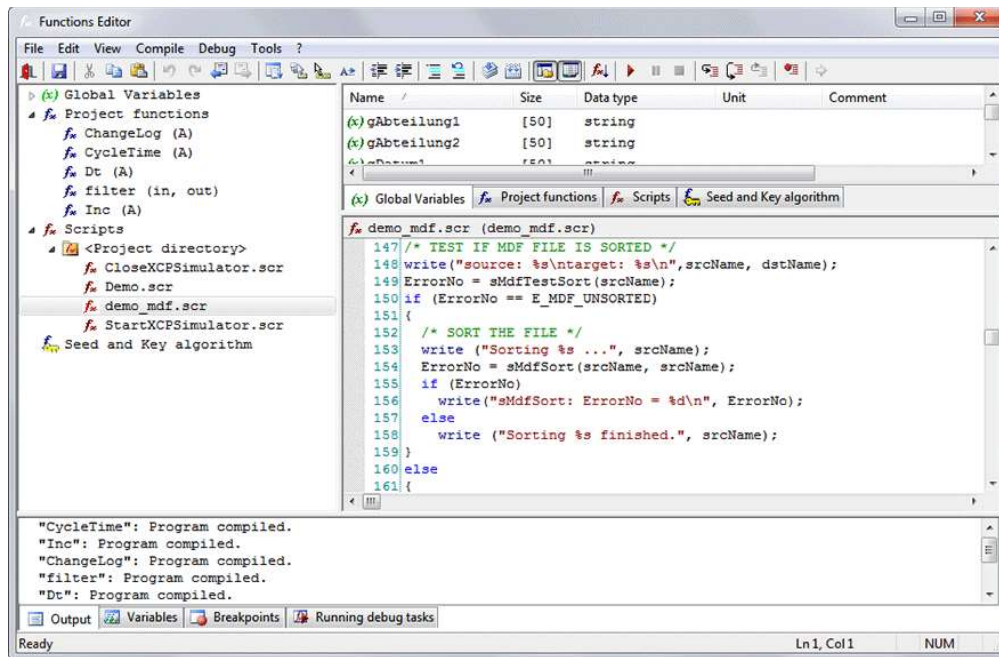


Bild 5: Create functions and scripts quickly and conveniently

6.2 Evaluation and analysis of multiple measurement files

If you want to extend an automated analysis to several measurement files, the data mining functionality provides you with a procedure for automated evaluation of signals in a series of stored measurement files. In this process, several files (with the same structure as far as possible, i.e. the same measurement signals) can be processed in one search run. The same evaluation algorithm is applied to all selected measurement files. The points in time that fulfill the condition for which you have searched are listed as so-called hits.

All functions and scripts already used in vSignalizer are available to you during data mining. You can view the results of the analysis either in the data mining dialog or in the "Symbol Explorer" of vSignalizer. All hits of the currently loaded measurement file are highlighted in the different display windows of vSignalizer. Double-clicking on a hit in the list moves the measurement cursor directly to the corresponding position in the display window. If you select a hit that is not contained in the currently loaded measurement file, vSignalizer automatically loads the measurement file and replaces the original measurement file.

In addition to the hits, further information is available, such as the search method used (this is important for parallel evaluation according to several criteria), the measurement file and the configuration. Analyses that have already been performed can be repeated at any time, e.g. to directly assess the effect on a changed measurement file.

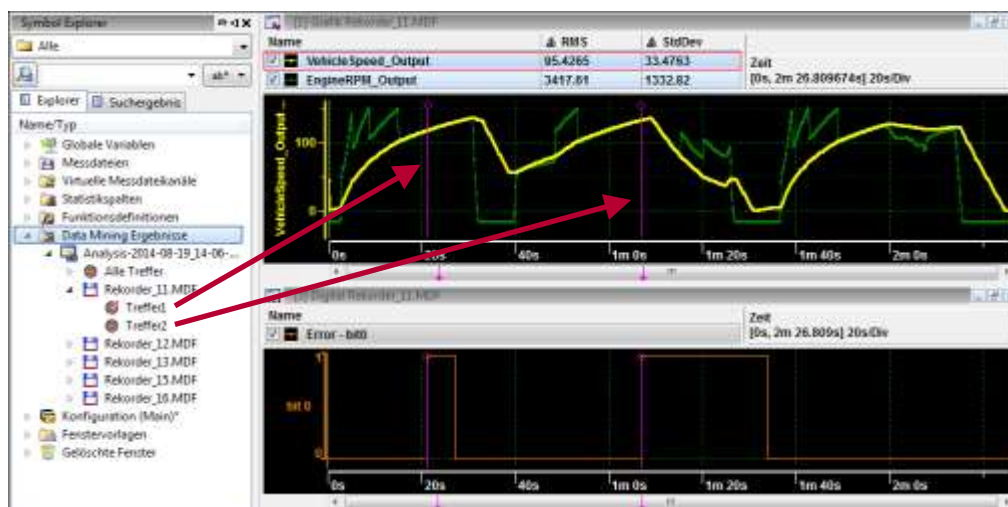


Bild 6: Direct links lead you to the found hits in the measurement files

The entire data mining process can be automated. You can set up panels that conveniently control the process. This enables even those users who do not have the necessary, specific know-how to evaluate measurement files and create reports.

A typical workflow contains the following steps:

- > Selection of the measurement files to be evaluated
- > Execution of data mining over all measurement files
- > Evaluation of the analysis results
- > Report generation

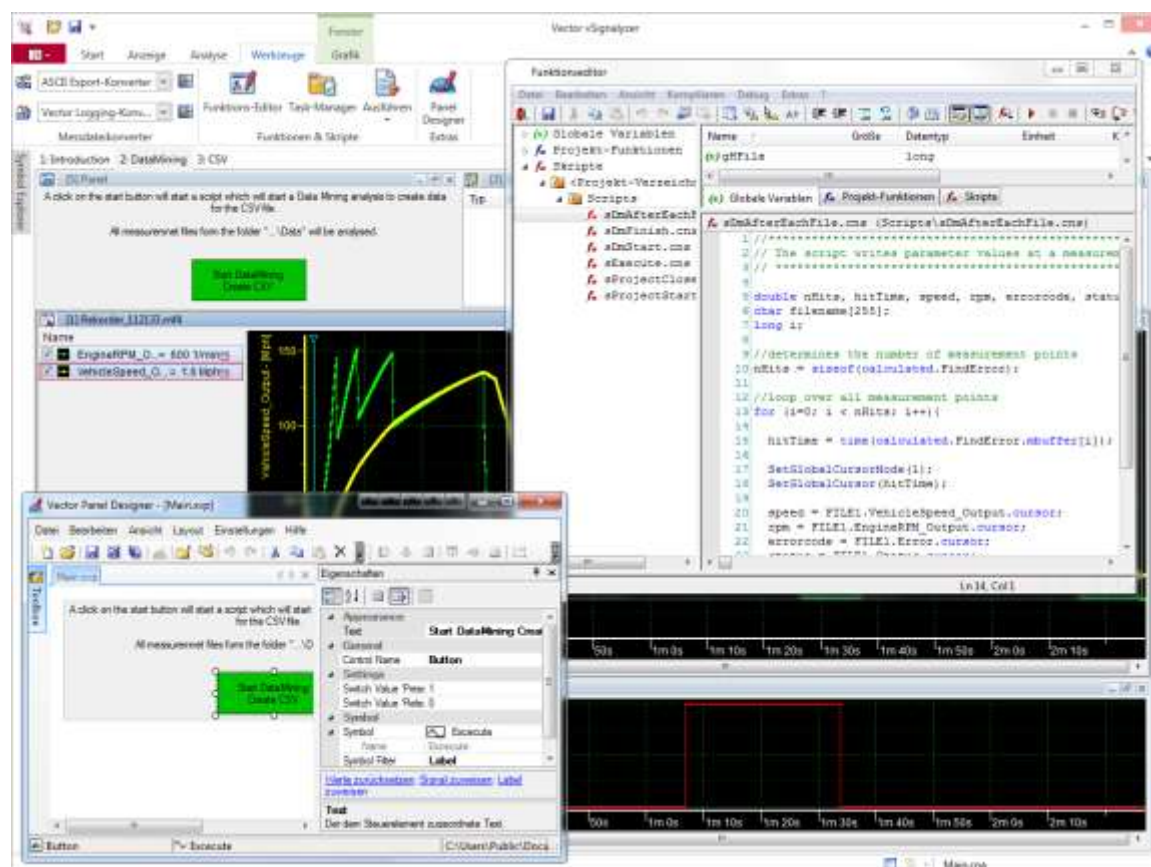


Bild 7: User-definable panels facilitate measurement data evaluation. With the editor you easily create functions and scripts.

The following functions are available for automated evaluation:

- > Script-controlled evaluation of measurement files
- > Conveniently search and analyze large amounts of data via the data mining user interface
- > Extensive function library for standard analyses
- > Easy formulation of own analyses with algebraic expressions in the graphical editor
- > Complex mathematical evaluations via the integrated function language CASL, own C/C++-based functions or with MATLAB/Simulink models
- > Display of data mining hits in graphical display windows
- > Automated export of analysis results in CSV and PDF format
- > Execution of complex evaluations via simple and understandable panels

7 Report generation

With vSignalizer, analysis and documentation of measurement data go hand in hand. The display pages you create for analysis can be displayed either in normal view or in print view. In the print view, all analysis windows and display elements are available - with the difference that they are displayed as they will later appear on the printed page. Use the headers and footers to create layout templates in the look and feel of your company and use display elements such as text boxes, graphics or arrows for expressive reports.

With the option of display switching, you either use your already created analysis pages for documentation or you create your own individual print display pages. In the print menu, you simply decide which pages you want to use for the report. The result can be printed or saved as a PDF file.

Drag and drop to conveniently save individual analysis windows or entire display pages as JPG, PDF, PNG on the desktop or paste them directly into Word or PowerPoint.

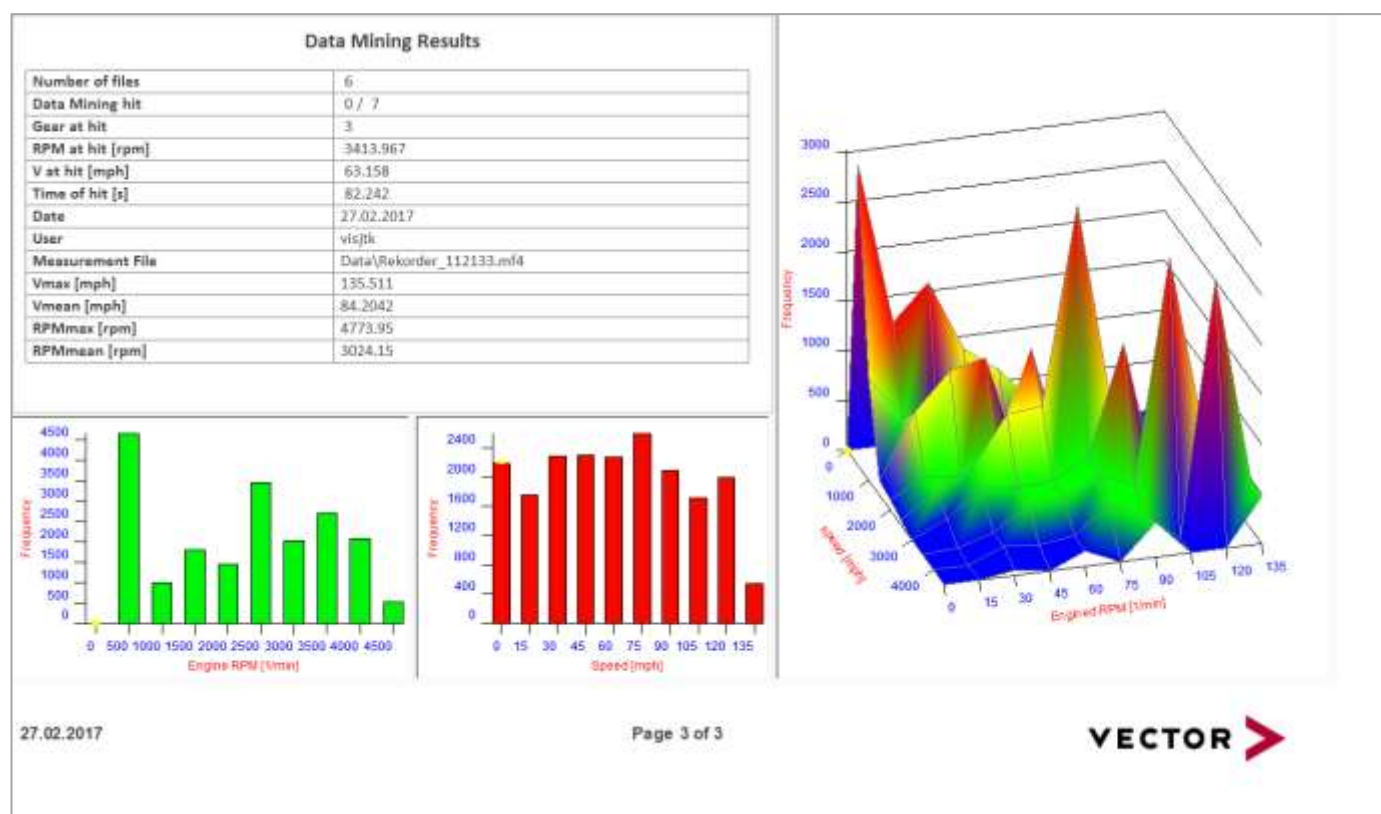


Bild 8: In the print view you create meaningful reports

The most important functions at a glance:

- > Creating professional layouts with the print template manager
- > Support of any paper format, even mixed in one report (e.g. portrait and landscape)
- > Switching between print and normal view in the display pages
- > Quick overview thanks to the page overview
- > Easily create reports using drag and drop
- > All display options of the analysis also available for report generation
- > Completely automated report generation of data mining results
- > Documentation of analyses with flexibly designable display elements
- > Text elements with predefined or user-specific, script-controlled macro functions

- > Export reports in PDF or EMF, PNG, JPG, GIF, BMP formats
- > Easily export entire display pages or individual analysis windows via script or drag-and-drop to other Windows applications, such as Microsoft Office

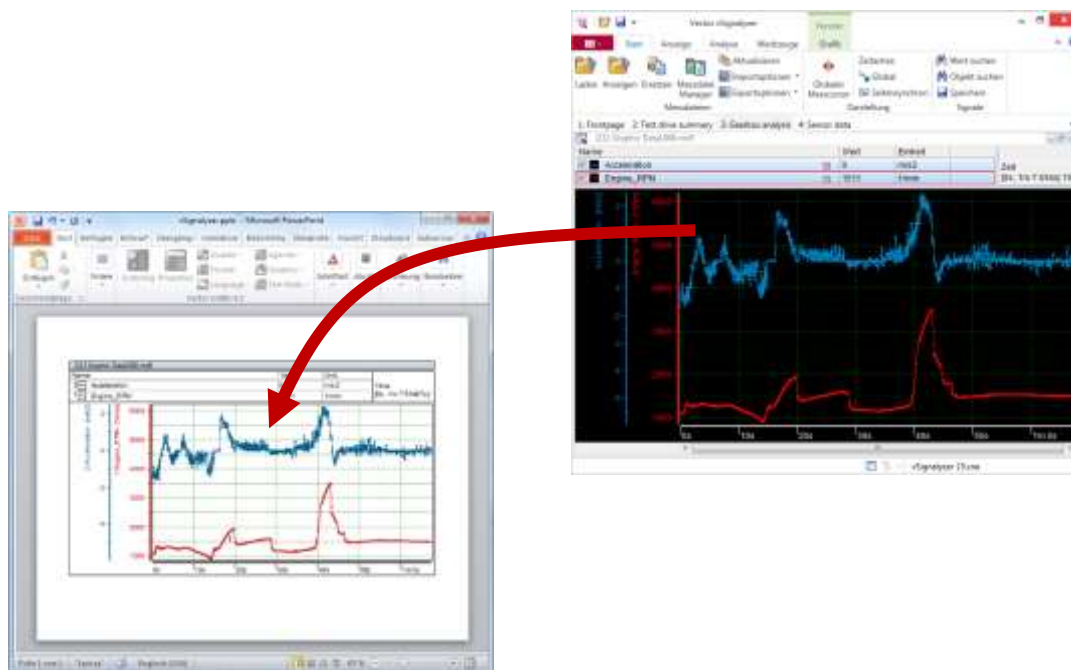


Bild 9: Drag-and-drop operation makes it easy for you to paste into external tools such as PowerPoint, Word, etc.

8 Supported measurement data formats

vSignalalyzer allows you to work with measurement data in numerous file formats:

- > MDF-3.x, ASAM MDF-4.x, INCA DAT, XLS, XLSX, MATLAB MAT 7.3, HDF5, TDMS

For formats that cannot be processed directly by vSignalalyzer, appropriate import converters are available. The conversion is done automatically when loading the file into vSignalalyzer:

- > BLF, ASC, ASCII, ATFX, CLF, CSV, GLX, GPX, KME, NMEA 0183, PCAP, TTL, UBX, XLG, XLX

If further processing of measurement files in another file format is necessary, vSignalalyzer supports the conversion of MDF files into a number of target formats:

- > ASCII, MATLAB (M/MAT), Excel

9 Analysis of recorded bus communication

The Trace window lists the recorded CAN, CAN FD, LIN and FlexRay bus activities, such as messages or error frames. By linking to a database, it is possible to display the individual signals of the messages in decoded form and to extract them directly from the trace window, for example into a graphics window. Due to the global measurement cursor, the trace messages are synchronized with all other displayed measurement signals in the vSignalalyzer. By clicking on a message or a signal directly in the trace window, the global measurement cursor jumps directly to the corresponding temporal position in all analysis windows used.

By supporting AUTOSAR 4.3, vSignalalyzer also enables offline analysis of PDUs in CAN/Ethernet log files, regardless of the database format used (ARXML, FIBEX). CAN/CAN FD frames with more than one PDU are supported and can be analyzed in the trace as well as in other signal windows.

Drag and drop measurement files directly from Windows File Explorer or vSignalalyzer's Symbol Explorer into the trace window.

Various methods are available for analyzing the data in the Trace window:

Filtering: The Trace window offers various filters. You can filter on a specific bus or with block and pass filters on individual messages to reduce the amount of data. Additionally, a filter can be applied to each displayed column.

Predefined column representations: For the standard bus systems such as CAN, LIN, J1939 and FlexRay, the trace window can be quickly adapted optimally. In addition, you can easily insert individual columns with further information in the trace window.

Search: Messages/signals can be found via search conditions.

Color buses: For easy differentiation of the displayed buses, they are highlighted in color.

Display statistics: Via different views, for example, details of the messages/signals including their values can be displayed in detail or differences of the time stamps or the signal values can be calculated.

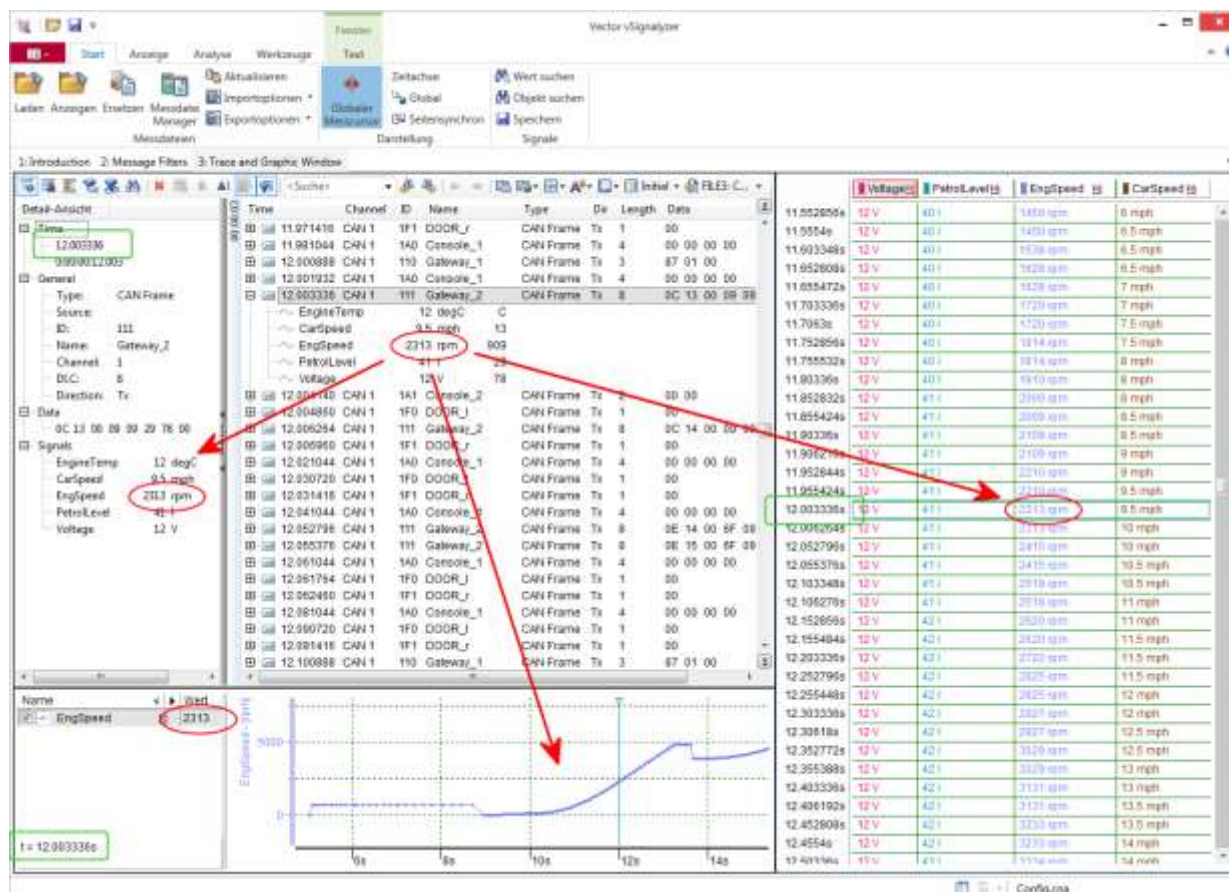


Bild 10: Trace window with time synchronization using the global measurement cursor

10 Visualize the vehicle position in a map

vSignalizer allows you to visualize the recorded GPS data on electronic maps. The interpretation of the recorded measurement data is greatly facilitated, as the geographical conditions can be taken into account during the evaluation. In the offline evaluation, the measured values are displayed synchronously together with the corresponding vehicle position in the map window.



Bild 11: The total route with the current position of the vehicle is displayed. With the "Driver Assistance" option, detected vehicles can be visualized as red crosses, for example, as shown here.

10.1 Fields of application

The possibility of synchronizing measurement data from a test drive with a geographical position and displaying this on a map makes it much easier to assign certain events. The behavior of your control unit can often be reliably tracked with this additional information, e.g. when shifting up on a hill.

The most important functions at a glance:

- > Displaying the vehicle position in the map window
- > Configurable display of the distance driven so far
- > Simultaneous visualization of geographical and vehicle-specific data in the various display windows
- > Synchronization of the measurement cursor with the vehicle position on the map
- > Simultaneous display of several vehicles (e.g. with Car2x communication)
- > Level of detail of the map display changes depending on the zoom setting

11 Evaluation of data recorded with loggers

In addition to signal-oriented visualization, a high-performance automated data analysis is particularly important for the large amount of data that is usually generated by data loggers. With data mining, vSignalyzer offers the ideal tool for this. For the analysis of the recorded bus messages, the trace window displays the messages time-synchronously to the signal progressions in the graphics window.

Recorded environmental data, such as GPS position and video data, are also visualized synchronously in time and facilitate your measurement data analysis. Data loggers often record sequences of individual images instead of a continuous video stream in order to use the available storage space as efficiently as possible. These single image sequences can of course also be displayed time-synchronously with vSignalyzer.

Voice comments recorded during the measurement drive often provide important insights for understanding a particular driving situation and thus for evaluating the measurement data. In vSignalyzer, these voice comments can be displayed as symbols in the graphics window and played directly by double-clicking on them. You can simply hide irrelevant voice comments in the Symbol Explorer in order to concentrate on the essentials.

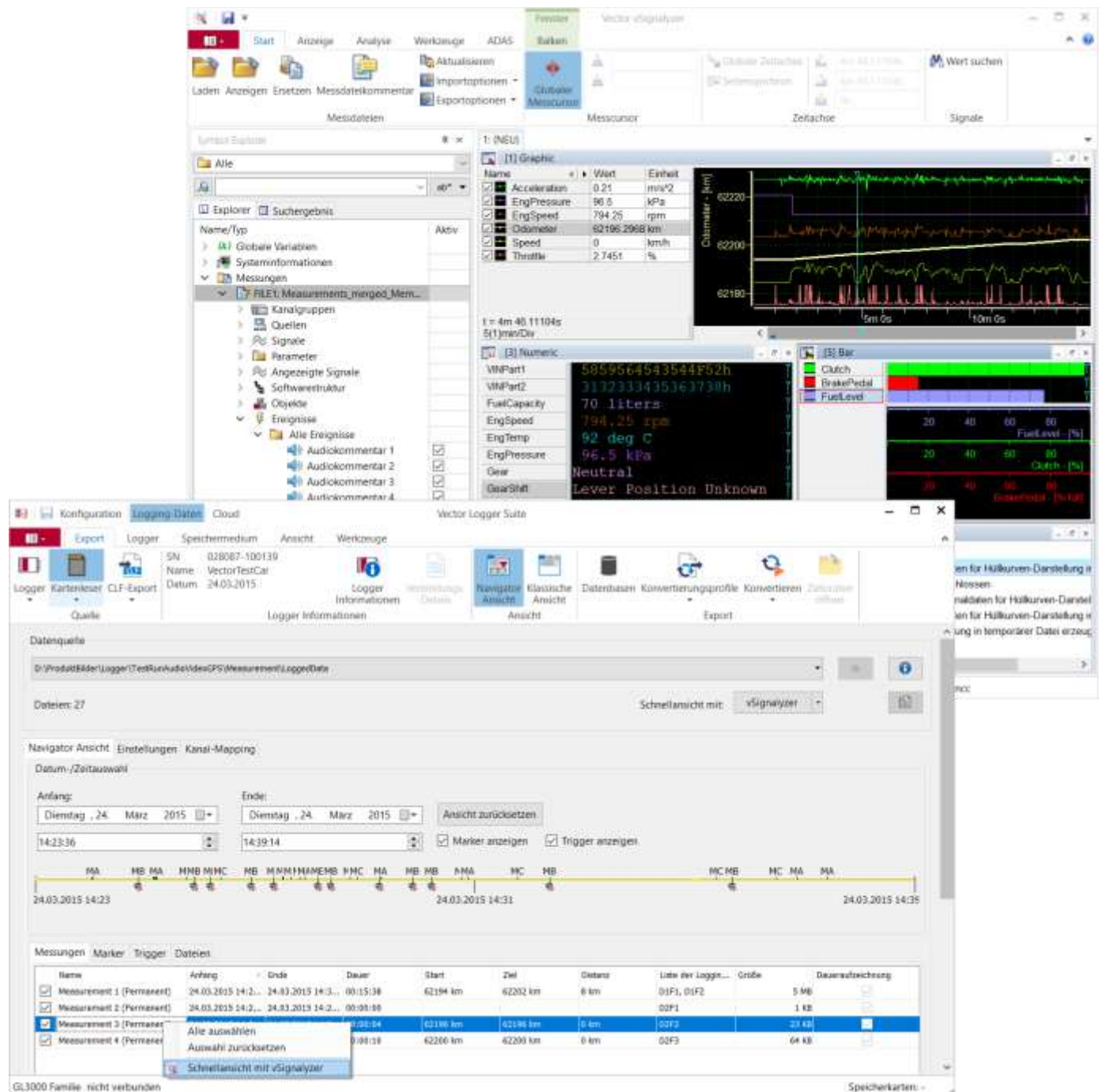


Bild 12: Start a data analysis directly from the Vector Logger Configurator with the quick view function

12 Development of driver assistance systems

The "Driver Assistance" option allows developers of driver assistance systems (ADAS) and systems for automated driving to visualize recorded sensor data time-synchronously in specific windows. In this process, the sensor data is superimposed on the video image in perspective as graphical objects (e.g. rectangles and lines) and additionally visualized in a side view or from a bird's eye perspective. In addition to being superimposed on the video image, the captured data can also be displayed in a map in true-to-position form.

In the video window, the sensor data are superimposed as graphical objects (e.g. rectangles and lines) on the video image of the reference camera in perspective and additionally visualized in a side view or from a bird's eye view. On the basis of the video image, you verify the recorded data and thus evaluate the reliability and operational safety of the system, regardless of

whether it is a radar system such as ACC, a lane detection system or a parking assistant. The scene window is available specifically for displaying the point clouds of the LIDAR systems.



Bild 13: Option "Driver Assistance" - Object verification for driver assistance systems and optimization of image processing algorithms

13 Measurement data management with vMDM

vMDM (Vector Measurement Data Management) is the solution for efficiently managing large amounts of data from development, test bench runs and driver testing.

With the vSignalizer function "Local vMDM" you can automatically index the measurement files on the hard disk of your workstation.

With the Vector Team Services application vMDM you store measurement data securely in the cloud, protect the data from unauthorized access, and facilitate the exchange of measurement data between distributed teams.

The vMDM Explorer gives you direct access in vSignalizer to all measurement data managed by vMDM, whether on local disk or in the cloud.

By using freely definable metadata, you create flexible order and search criteria. Both the test vehicle and the measurement technology or control unit hardware/software used can be described with characteristics that are important for you. This ensures that all measurement data can be found quickly and reliably at any time and can be used for data analysis.

This is not limited to the manual analysis of individual files. With the freely definable search queries, you can find the matching measurement files and start the automatic analysis in the cloud at the push of a button.

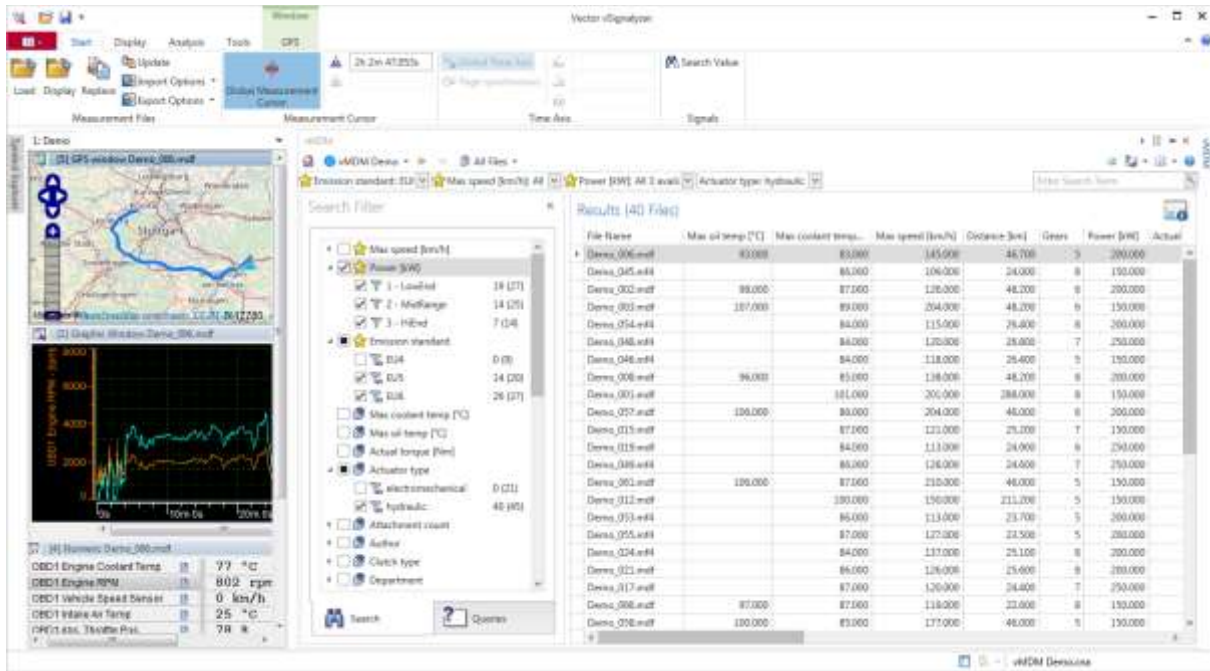


Bild 14: Quick access to measurement files with the vMDM Explorer window

14 Visualization of thermodynamic measurement data

During the development and testing of all types of air conditioning and cooling systems, physical variables such as pressure and temperature are recorded on the test bench or test vehicle, usually together with other measurement signals and variables internal to the control unit. In order to evaluate the system parameterization, as well as the components and coolants used, the engineers from the field of air conditioning technology require a specific data visualization for thermodynamic data.

With the vSignalizer Thermodynamic State Charts option, you can now display thermodynamic data time-synchronously with other measurement data and generate meaningful state diagrams for offline analysis.

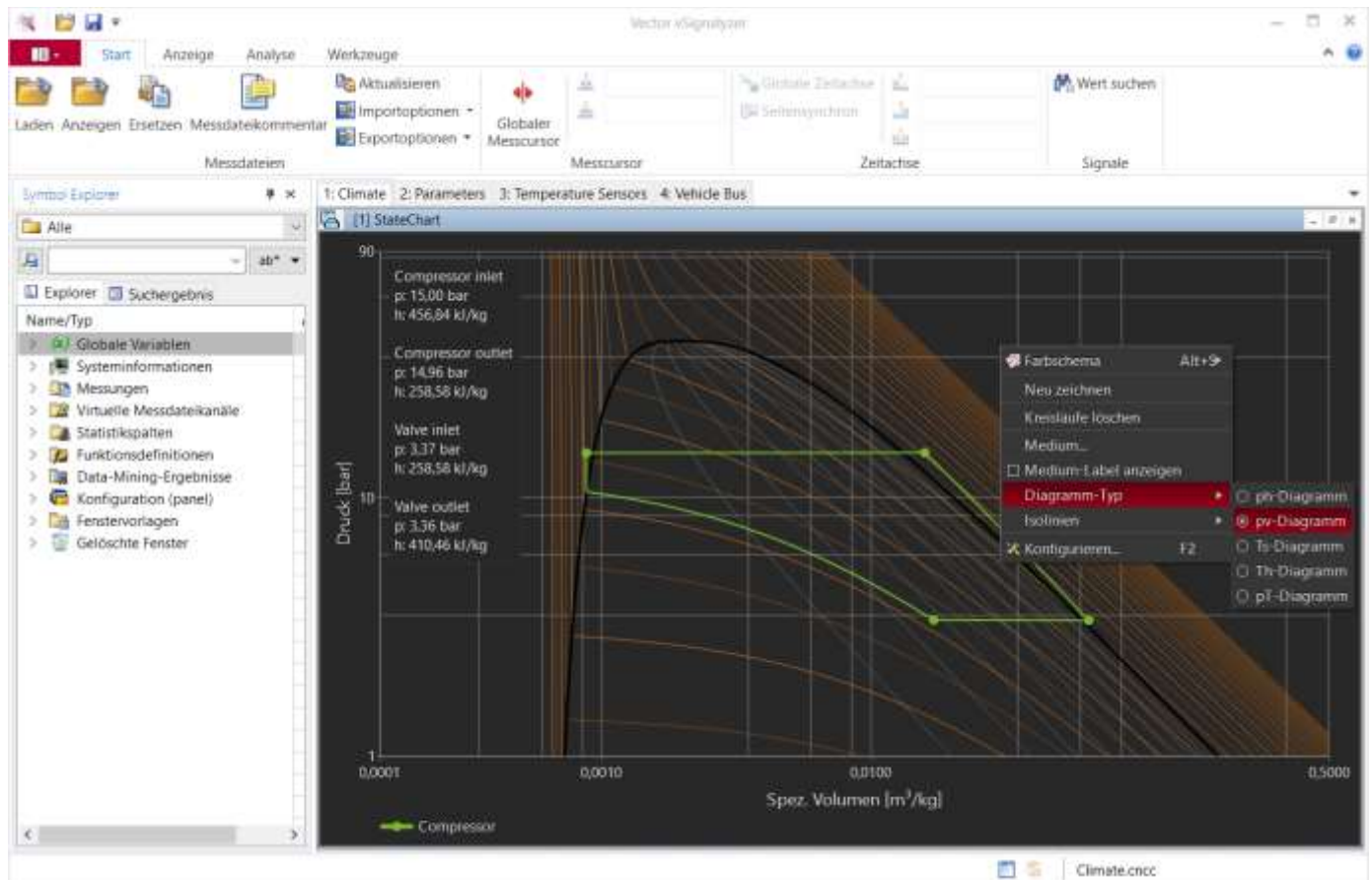


Bild 15: Professional display of thermodynamic state diagrams with the Thermodynamic State Charts option

15 Engineering services

So that you can concentrate fully on your ECU development, Vector supports you both with know-how and with customized complete solutions for your tasks. The range of services extends from consulting services, for example for the development of customer-specific analysis scripts, through integration support to a field application engineer at your site.

16 Trainings

As part of our training offering, we provide training for vSignalizer in our seminar rooms as well as on-site at your location.

More information about the training courses and the dates can be found on the Internet at: www.vector-academy.de.



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