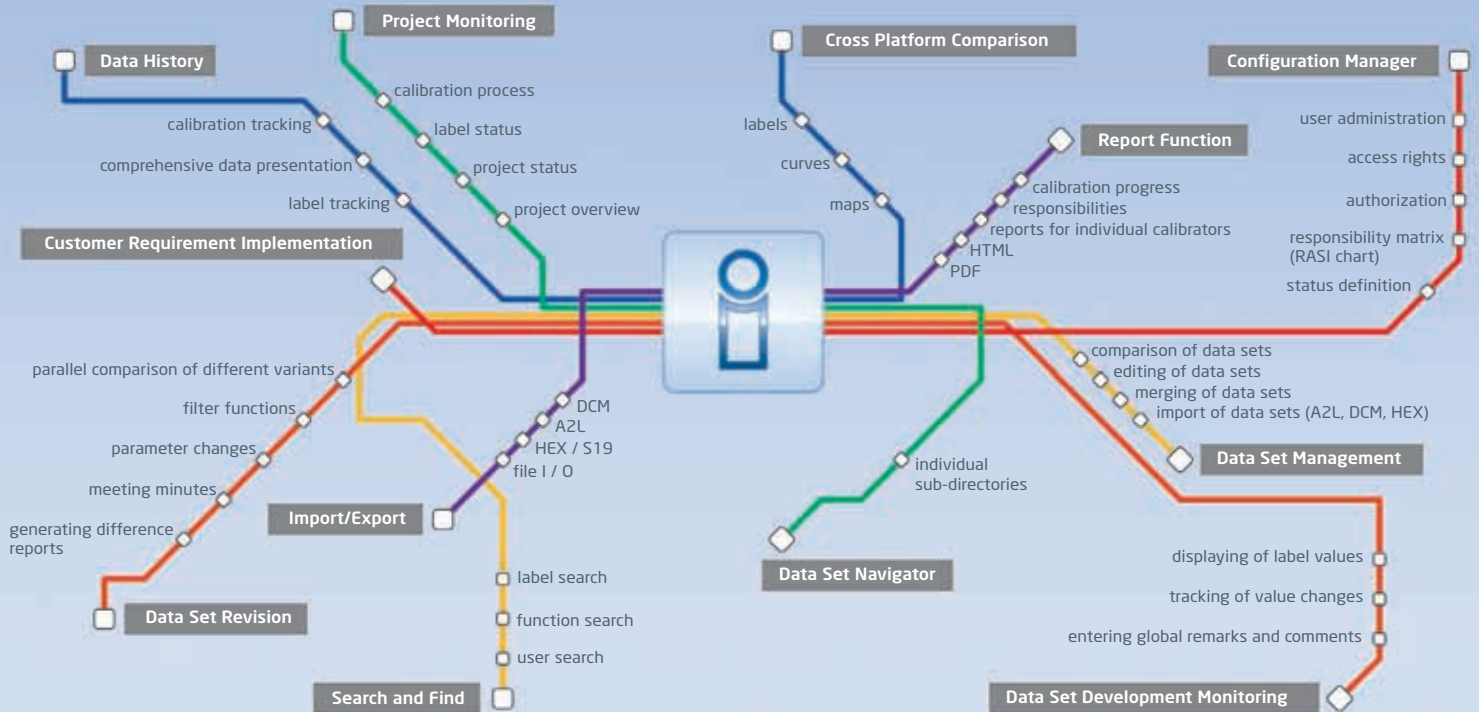


CalGuide®
Data Set Management

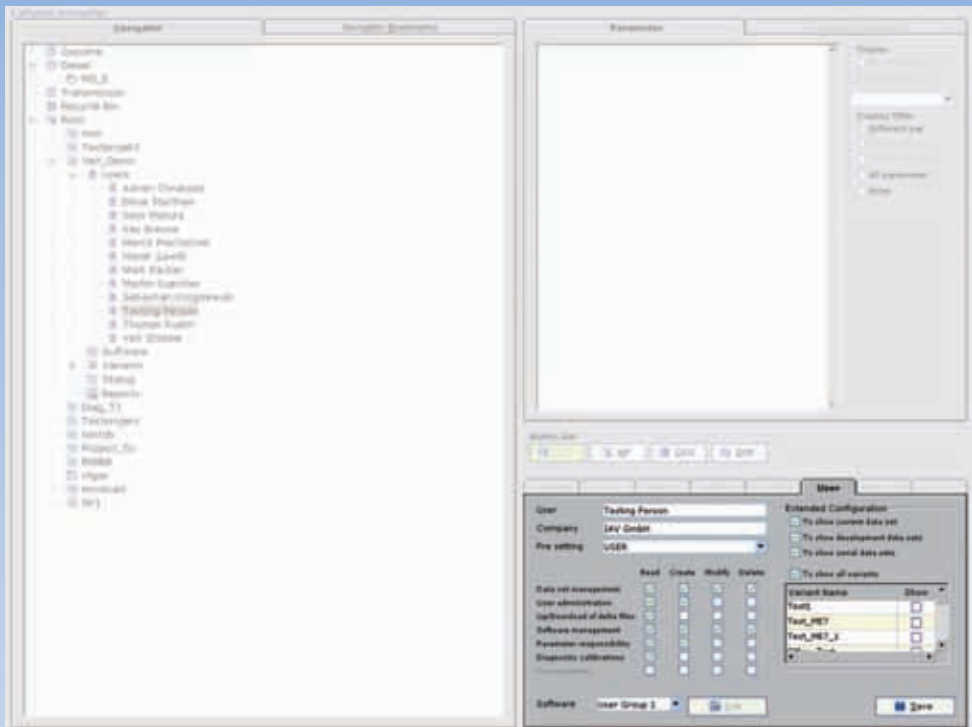




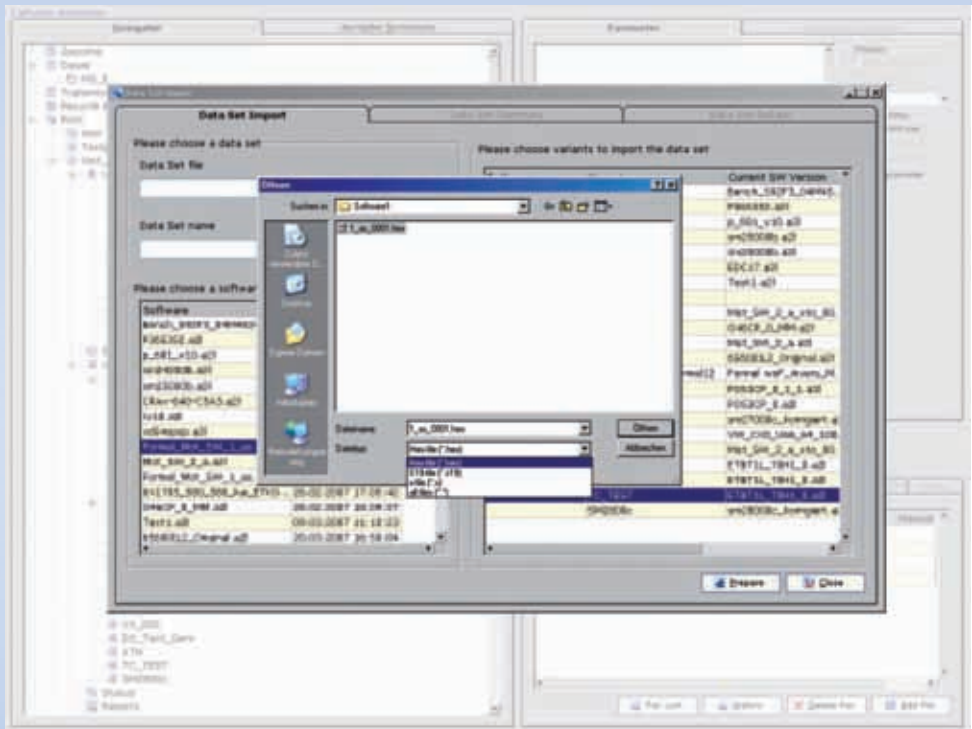
CalGuide® at a Glance

CalGuide® is a process-oriented tool which covers the complete life cycle of calibration data, from initial data to production release. It supports essential functions such as version control, documentation, comparison and merging of data sets, as well as comprehensive report generation and access management with a Responsibility Approval Support Information Chart (RASIC). Tracking calibrations as they develop over time and reconciling diverging data sets are a breeze with CalGuide®. Whether engineers are on the road or in their office, remote access to the database allows globally shared development without interruption. Project managers can obtain reports about the current status of the calibration in an instant. Most importantly, the well-designed user interface of CalGuide® supports the natural work flow of the calibration process. This enables engineers to focus on their prime task: creating the perfect calibration.

Already proven valuable in several large-scale projects with various OEMs, the CalGuide® motto is "From Calibration Engineers for Calibration Engineers". The CalGuide® tool supports calibration engineers, allowing the focus to be on core competencies when the complexity of the control unit software increases. Originally developed to be used as an internal tool to improve efficiency, it has since evolved into a commercially available data set management tool. IAV offers customer specific modifications, which adapt CalGuide® to unique company requirements.



Configuration Manager



Import/Export

Configuration Manager

The administrator creates all user accounts. The configuration manager facilitates the overview of the users' rights management in the CalGuide® system. Access rights are centrally managed, with administration and project data stored separately on the server. This allows for individual structure models of project data visualization. Authorization rights are broken down at the global and project level. Global level authorizations stipulate who can set-up, change and delete users. This level also provides the ability to create folders in the project structure, in addition to authorizing how and where data should be saved in order to ensure the best possible factual order is maintained. The project level is designed to manage the individual users on the project, such as who is authorized to see what, and who is authorized to create data sets. The responsibility matrix assigns the calibration parameters to the respective calibration engineers according to the RASIC. Status definitions are implemented in PACO format (Performance, Availability, Configuration, Operations), but can also be individually defined and depicted as icons.

CalGuide® offers the possibility of importing and writing HEX/S19 files. Reading and writing A2L files is also possible. DCM files can be imported; the writing of DCM files is not necessary since they are stored and processed in the database. Files in the PACO format can be imported. Comments and status of the PACO are kept and carried over into the database.

Supported file formats

- ▶ A2L
- ▶ Intel-Hex
- ▶ Motorola S19
- ▶ PaCo (XML)
- ▶ DCM (Etas)
- ▶ PAR (Vector)

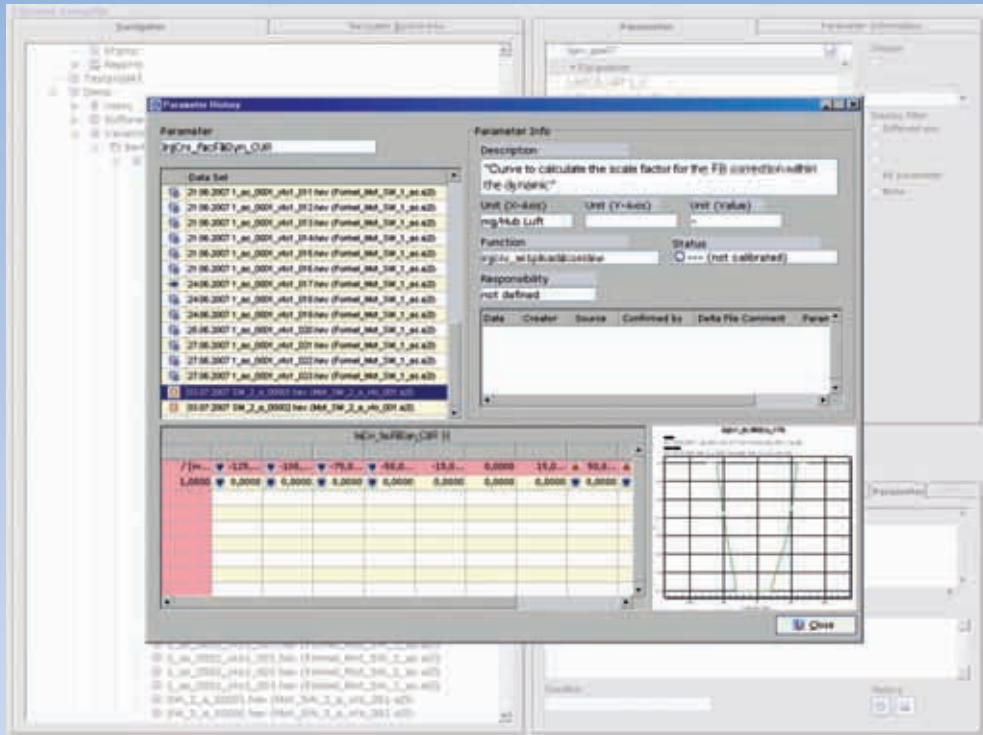
Data Set Management

The data set management enables variant coding to determine locked calibration parameters that are explicitly intended for only one vehicle variant. This can be used for vehicle type, data set characteristic value or other important information. Locked calibration parameters can be selected manually and, therefore, changed manually, if desired. During the data set import, it is possible to select for which variant the files are valid. The variant coding is always included and is automatically copied into the current data set. Data set merging includes the following two main items: the merging of delta files and the merging of test data status with the current data status of the database. The individual delta files are checked for responsibility, double-entered calibration parameters and variant coding. When generating a new data set, the calibration parameters that are to be changed manually are queried again to avoid errors. The same mechanisms are used when merging test data status and the current data status of the database. The merging of characteristic curves and maps is supported by CalGuide®. Different data

can be viewed and the areas of interest can be merged. One example may be the problems created when one team has carried out a cold-climate test and another team a hot-climate test and the data are fed back. Data set comparison is quick and uncomplicated. The great advantage is easy cross-variant data set comparison.

The data set navigator helps to configure the project setup in the customer's preferred way. The folder structures can be created with almost no restrictions, per individual needs. The Favorites Display can be used to create a 'quick route' to specific projects.

The development steps can be traced by recording the reasons for value changes of the calibration parameters or recording global comments on the data status. This is how an overview of why and when something has changed can be maintained. The display of calibration parameter values provides a helpful and quick overview.

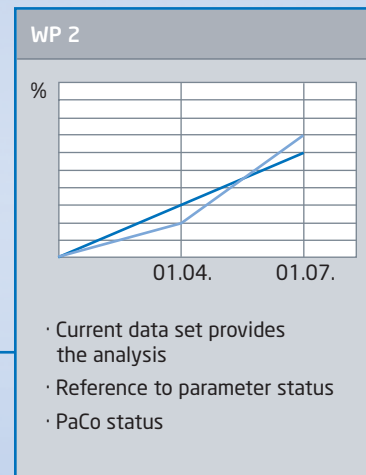


Data History

Milestone	Work Package	Target	Current
2007-04-01	WP 1	60 %	70 %
	WP 2	30 %	20 %
	WP 3	70 %	50 %

2007-07-01	WP 1	80 %	80 %
	WP 2	60 %	70 %
	WP 3	80 %	60 %

Project Monitoring



Data History & Project Monitoring

The calibration history visualizes and displays change progressions in calibration parameters. Comments and descriptions can be saved when making changes, ensuring that the reason for the change remains clear. An overview of the status progression within individual parameters is available at any time. An important addition to the program includes details regarding which calibration engineer is responsible for modifying the parameter.

The comprehensive data depiction displays calibration parameter history, visualizing calibration progression on the parameter level across all data status of one variant.

Work packages can be created in the calibration process. Here, all relevant calibration parameters for a function can be combined (e.g. an idle governor function). A calibration process review is possible, which can be used to create a recommended chronological calibration progression, thus preventing loops in the process. The calibration parameter status details the complete work package. It is possible to receive information on the maturity of the work package or function. The project status is helpful to all those responsible for the project, as it provides the possibility of evaluating the development of the work packages from milestone to milestone. The project overview provides an overview of all variants. Information such as software version, status etc. can be displayed and exported in an Excel-compatible format. The exported files can then be used for graphical analysis visualization.

Data Set Manipulation

The search and find feature has three basic categories: user search, function search and calibration parameter search. For example, the user search can find an individual user or locate the person responsible for a calibration parameter. A name search identifies which calibration parameters are assigned to an individual calibration engineer. The function search provides an overview of all calibration parameters for one module. When creating a new data-set, this function provides a quick overview of all new and omitted calibration parameters. This search can also be very helpful in identifying differences between data set variants.

When generating change reports, the information from a complete data set comparison is made available in one report, with an option to comment on the changes. A data set comparison is used as a basis for the meeting minutes in order to discuss the configuration of the calibration parameters. Change requests can be saved directly from the data set discussion to the database and made available for the creation of the new data set. It is also possible to

select the vehicle variants to incorporate these changes. Parameter changes can be documented and an overview is kept of when and why a calibration parameter has been changed. The filter functions enable reporting according to responsibilities and groups or functions, which provides a quick overview. In the parallel comparison of different variants, it is possible to compare data sets from several projects in order to facilitate a common calibration strategy. A quick overview of the calibration parameters is displayed in a concise way, allowing differences to be immediately identified.

Cross-platform comparisons are used to compare calibration parameters, maps and curves, permitting a quick overview of the differences in the variants. This special feature is very helpful for identical parts and identical calibration strategies. Basic calibrations are supported by this comparison.



1. Overview of unit data

Description	Information
Hardware 1	Version 1.0
Hardware 2	Version 3.2
Software modul 1	New release
Software modul device 1	Changes from software supplier

2. Overview of data sets

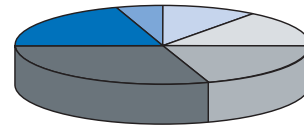
Currently delivered data set	ASAP file	Recipient	Date of delivery
Data_set_05.hex	Mot_SW_1_as.a2l	Member 1 Member 2 External member	28.08.07

Previously delivered data set	ASAP file	Recipient	Date of delivery
Data_set_06.hex	Mot_SW_1_as.a2l	Member 1 Member 2 External member	21.06.07

3. Calibration modification / Changes between the data sets

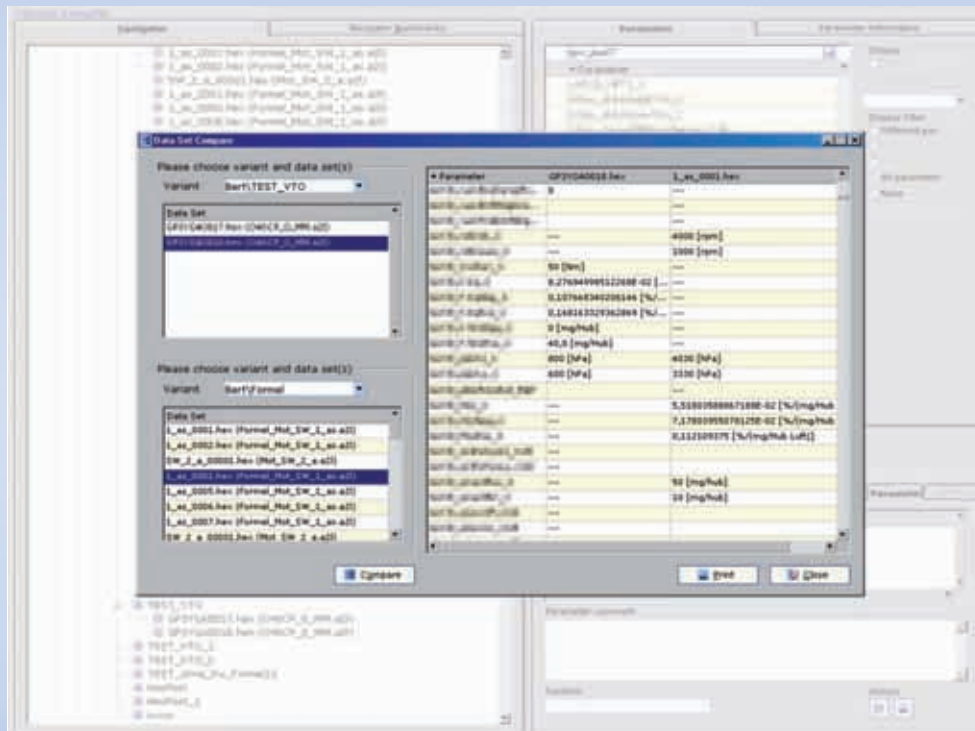
#	Function	Description
1	Air Mass	Air Mass Flow Sensing
2	Oil Temp	Oil Temperature Sensing Component Driver

- not calibrated
- changed
- prelimCalibrated
- calibrated
- checked
- completed



CalGuide - Dataset delivery document Mark Bäcker 17.09.2007

Report Function



Cross-Platform Comparison

Report Function

The calibration progress can be displayed on the calibration parameter level in the data status. In this way, a milestone check can be carried out on the project level. The raw data generated from this is Excel-compatible and can therefore be further processed into diagrams. A list of calibration parameters sorted by calibration engineers can be obtained under responsibilities. This also warrants a display of the calibration parameters of the entire function and of all calibration engineers. It is possible to document which

calibration engineer is responsible for which calibration parameter in the individual reports. There, the calibration engineers can see the completion status of the calibration parameters assigned to them. A history of the changes of the individual parameters is also available. A detailed data set comparison is available for a quick overview of changes. The reports can be generated in HTML or as a PDF.





Further Developments

CalGuide® is a powerful data set management tool with the ability to customize according to customer requirements and requests. CalGuide® can be adapted to every company's organizational structure to maximize the calibration engineer's efficiency.

CalGuide® is available in German and English.

Further developments to look out for:

- ▶ Additional language versions are in progress
- ▶ Diagnostics overview
- ▶ Graphical visualization of maps and characteristic curves
- ▶ Calibration parameter and data set verification via component expert database
- ▶ Storage of data set-specific files in the database

