

IAV EasyDoE

Optimizing engines – the fast, easy and cost-effective way

Design of Experiments (DoE) is a method that makes it possible to parameterize engine control units easily and efficiently. It is based on mathematical models and significantly reduces the work involved in calibration.

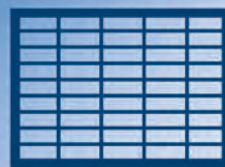
IAV can look back on many years of successfully using the "Design of Experiments" methodology in a wide range of different projects. The EasyDoE software was developed on the basis of the knowledge and experience gathered by IAV's engineers. The aim was to make the DoE process accessible and simple to follow without having to sacrifice specific expert settings. As such, the software not only takes the effort out of designing a complete experiment but also lets the user make specific changes with advanced settings.

Used in conjunction with a test bench automation system, such as ORION, EasyDoE covers the entire DoE process. From test planning to modeling and optimization, the software guides the user through all of the steps involved. In doing so, it displays the underlying data in a way that quickly makes all key aspects in designing experiments easy to understand. Each step is stored in an interactive workflow that allows the user to move back and forth within the process.

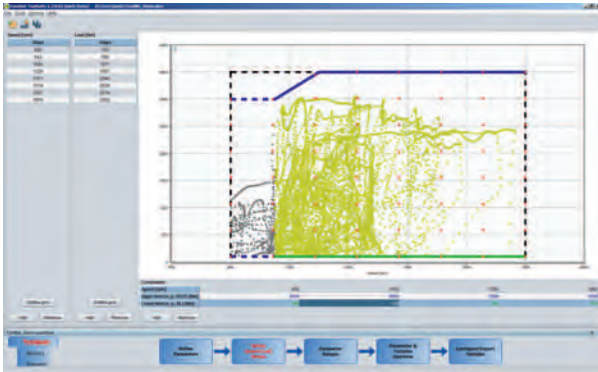
Integrated interfaces, such as exporting models to Matlab, complement the range of functions.

Functionalities:

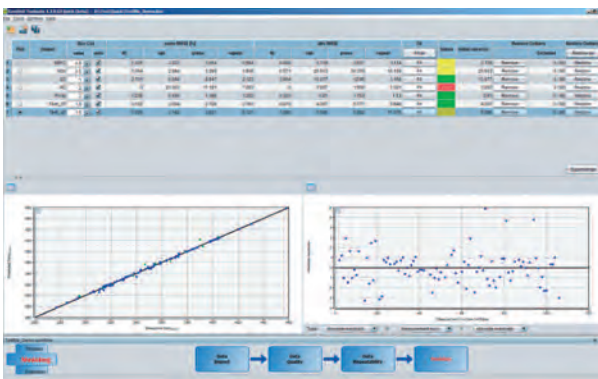
- *Workflow-based, straightforward user guidance*
- *Preconfigured DoE process*
- *Block-by-block test planning*
- *Automatic selection from various model approaches (polynomial, RBF, GPM)*
- *Automatic outlier detection*
- *Fully integrated Matlab interfaces for exporting models*
- *Graphic model evaluation*
- *Map-optimized OptiMap*



Finding the Optimum Step by Step



Configuring experimental space



Modeling



Model evaluation

Utilizing Existing Knowledge

EasyDoE guides the user through all steps of DoE. Preconfigured settings provide the ideal foundation for quickly obtaining the optimum result. The process begins by defining the engine's input parameters as well as the limits within which they are to vary. These limits can be defined in different ways, e.g. based on maps that are already known. This makes it possible to divide up the test space in any chosen way. These settings then serve as the starting point for generating a test plan that is used for measuring the engine on the test bench.

Automatic Model Comparison

Once the measurement data is available, EasyDoE is used for "training" the models. Here, the software automatically looks for the best model approach. Selecting from either a polynomial model, RBF network or Gaussian process model. The user is then able to assess model quality and select models for optimization. Models can be evaluated in graphic form on the basis of various interactive diagrams and also be exported through the integrated Matlab interface for further use in optimization programs.

Integrated Optimization

EasyDoE's "OptiMap" plug-in is an integrated solution for optimizing maps from start to finish. It guides the user through a workflow in which all optimization settings can be selected. The plug-in comes with the option of defining several optimization target sequences that can be run and repeated. A separate optimization target can also be defined for each operating point within the map.

Benefits for Your Development Process

- Easily accessible use of DoE
- Less time on the test bench
- Utilization of available knowledge and given specifications
- Wide range of optimization capabilities
- Efficiency in calibrating control units
- Tried and tested over many years and continually improved

If required, flexible support can be provided by experienced IAV engineers.

Are you interested in finding out more? If so, please contact us at info@lanikasolutions.com

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