

IAV Engine

Dimensioning and Optimizing Engine Mechanics

IAV Engine is an integrated tool for designing all aspects of mechanical drives in the powertrain with:

- Flexible and interactive modeling and short simulation times
- Modern functionalities and consistent data model
- Well-engineered evaluation capabilities (e.g. animation, variant management).

The IAV Engine software suite supports:

- Kinetostatic and dynamic layout of valvetrains, cranktrains, control and accessory drives as well as the overall system
- Modeling and optimization of crankshaft geometry
- Design and analysis of engine mount system
- Simulation of longitudinal dynamics for analyzing conventional, electric and hybrid powertrains
- Analysis of overall engine friction.

Typical working methods used in dimensioning engine mechanics are supported by an intuitive and flexible user interface, wizards, interactive designers, an integrated variant management system as well as well-designed post-process and animation techniques. IAV Engine is scalable and modular in design which means it can be packaged to suit the customer's specific needs. Integrating this tool in workflows and mathematical optimization (e.g. within IAV's Engineering Toolbox) provides the key to enhancing design quality.

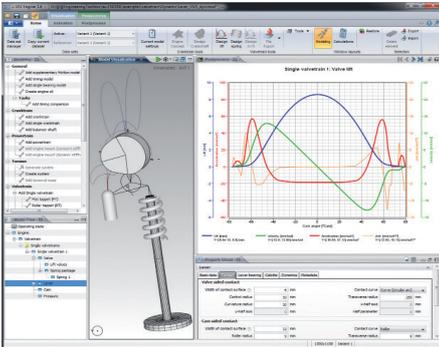
Whether designing new, efficient and reliable powertrains for production or concept vehicles, optimizing the design of entire model range concepts for large engines, adapting the mechanical drives of a racing car for the next race, simulating any conceivable failure scenario or evaluating a development's potential for cutting CO₂ – IAV Engine always provides the necessary tool flexibility.

IAV Engine incorporates IAV's tried and proven expertise in developing mechanical drives for engines and powertrains in an entirely new quality and in the form of a standardized software suite.

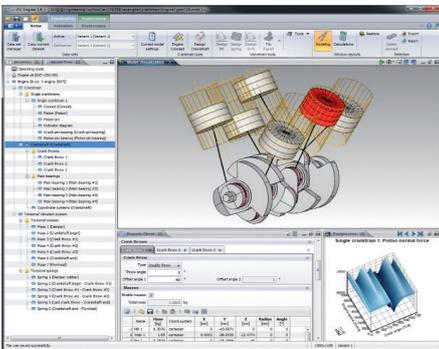


Product by IAV

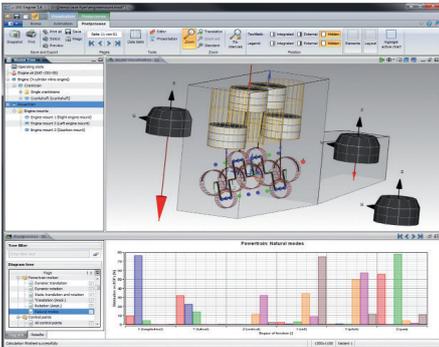
Tools for Engine Mechanics



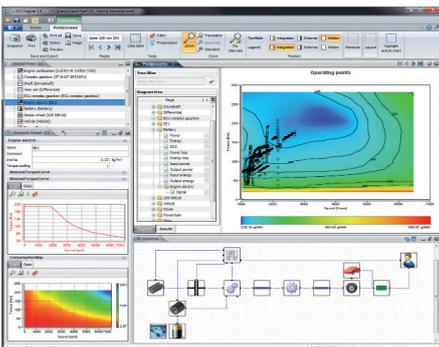
Valvetrain layout



Cranktrain layout



Engine mount system



Powertrain simulation

Designing and Optimizing the Valvetrain

IAV Engine offers a comprehensive package of functions for designing and computing all common conventional and variable valvetrain types (including high-pressure pumps). In particular, the module stands apart from other software programs by integrating the subcomponents needed for designing cams and valve springs as well as for computing kinetostatics and dynamics. As a result, all steps from designing cams to analyzing valvetrains can be performed in one model. Interactive designers for valve lift and for valve springs (cylindrical, conical or beehive springs with progressive characteristic curves) combine tried and proven interactive design tools with integrated optimization methods.

Designing and optimizing the cranktrain and crankshaft geometry

IAV Engine provides modules for designing and analyzing a combustion engine's cranktrain and for modeling and optimizing crankshaft geometry. A wizard can be used for quickly generating an initial basic model of the cranktrain and a parametric crankshaft model by entering a few key parameters. Further entries can then be made to refine and complement the model. This can be done, for example, by adding proposed balancer shafts. From computing forces and moments in the cranktrain through to analyzing friction bearings and torsional vibration, IAV Engine gives the user a wide range of evaluation and analysis options.

Modeling and designing control and accessory drives

IAV Engine provides a further module for interactively modeling chain, belt and gear drive systems. Besides interactive designers for generating the layout (including guide and tensioner blades), tools are provided for dimensioning the tensioning system, evaluating the geometry and kinetostatics as well as for estimating elongation and friction. Interfaces to dynamics simulation programs and CAD systems integrate the module directly into the design process.

Designing and analyzing the engine mount system

IAV Engine provides extensive aids for designing the engine mount system. The forces and moments computed by other modules (e.g. cranktrain, valvetrain) can be applied to the powertrain as excitation. After defining the engine mounts, this provides the basis for determining and visualizing movement of the powertrain, mount reactions (e.g. forces, displacements) as well as the engine mount system's natural frequencies and natural vibration modes.

Powertrain longitudinal dynamics and cycle simulation

The powertrain module provides a simulation tool for analyzing conventional, electrical and hybrid powertrains, all-electric and hybrid powertrains with appropriate operating strategies. In addition to computing rating parameters, such as sprinting, gradability and performance values, consumption can be determined in a cycle simulation. Extensive visualization and evaluation functions as well as advanced macro/script capabilities are also available.

Optimization

In conjunction with the ET.UNO optimization module from IAV Engineering Toolbox, computationally intensive parts of the design process can be efficiently automated by means of mathematical optimization processes.

Platforms and system requirements

The software runs in Windows and Linux.