dynardo
dynamic software & engineering

optiSLang® and CAESES®

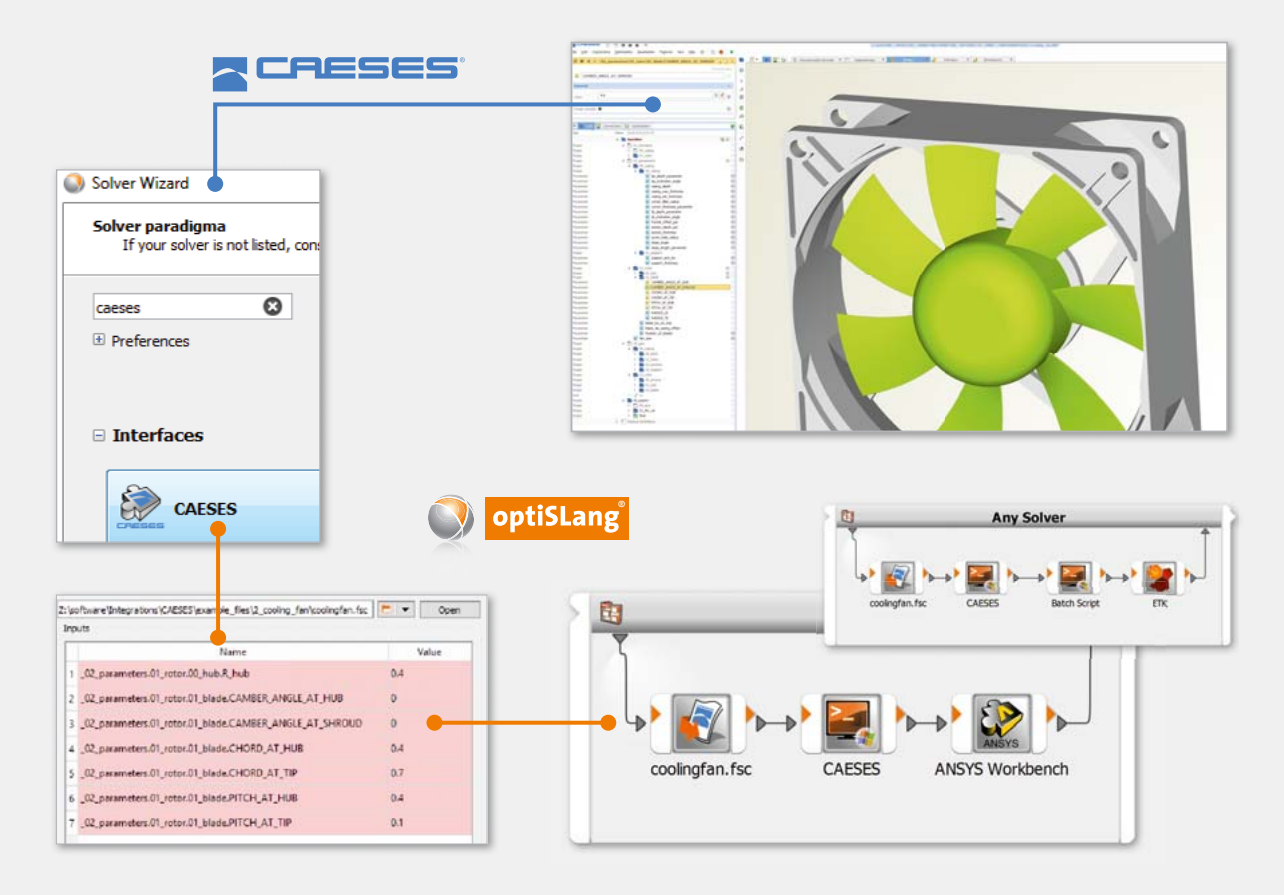
Sensitivity analysis, optimization and robustness evaluation with optiSLang® and CAESES®.

optiSLang®

optiSLang is a software platform that optimizes your product designs with methods of robust design optimization (RDO). The optiSLang toolbox includes modules for sensitivity analysis, optimization and robustness evaluation that you can easily activate by drag and drop to form an interactive process chain. This process workflow enables your engineering teams to improve product performance, identify optimization potential, quantify risks and secure resource efficiency. The software automatically identifies influential input and output parameters and quantifies the prognosis quality of meta-models by variation analyses. Complex workflows with several CAx tools can be integrated and used for automated analysis. It provides an interactive postprocessing to analyse and visualize the results.

CAESES®

CAESES is the CAD engine for simulation engineers that want to conduct automated shape optimizations. It is used in many industries and focuses on the efficient and robust variation of complex free-form surfaces. Typical applications are turbochargers, pumps, volutes, turbines, ducts, wings, intake/exhaust manifolds, piston bowls, ship hull forms and many more. CAESES helps you to avoid busted or invalid geometries to drastically speed up your process. No pre-processing is needed – the geometry is directly ready for fully-automated meshing and analysis. CAESES comes with easy-to-use automation capabilities which allow you to also run it in batch mode. It is fully integrated with optiSLang and ANSYS Workbench which makes it a joy to plug it into existing simulation-based workflows.

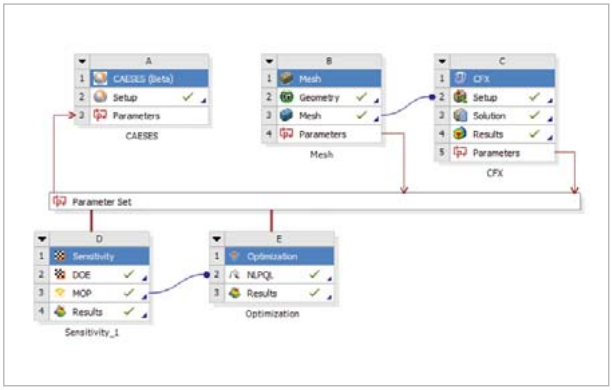


Setup of an automated simulation and optimization workflow using optiSLang, CAESES, ANSYS Workbench or other solvers

Features and benefit of integration

optiSLang offers a wide range of direct integration nodes. These can be immediately called up or run inside optiSLang. Compared to calling up an external CAE process, this makes design evaluation much faster.

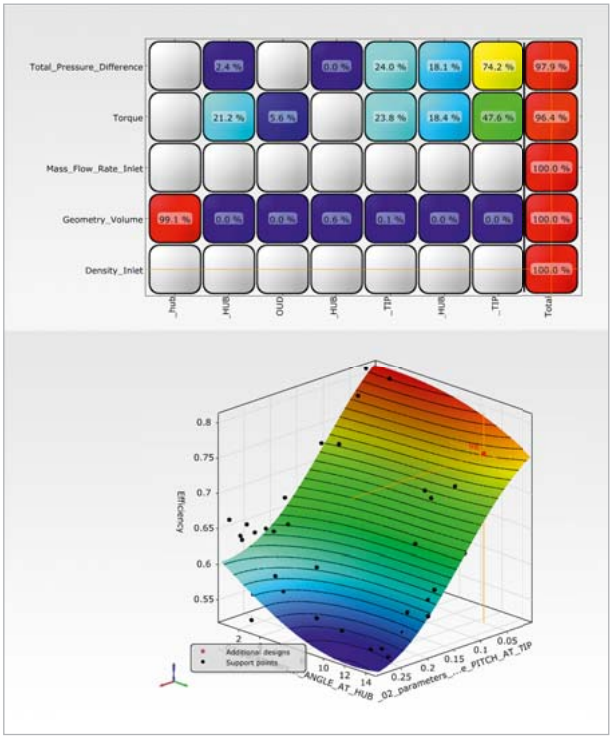
optiSLang users get immediate and intuitive access to the powerful CAESES CAD models through the graphical user interface (GUI) of optiSLang and the ANSYS Workbench (see front page). The design variables of the parametric CAESES geometry are automatically provided to the optiSLang user by simply loading the model. The geometry generation is controlled within optiSLang to create large sets of geometry variants with a single click. There is no CAESES expertise required to make use of this connection. This enables you to find your optimal design candidate, and it brings together the latest optimization technologies from optiSLang and the robust and efficient CAD models from CAESES. No scripting is needed – the interaction between the two software packages has been streamlined to conduct comprehensive design studies and RDO with highest ease.



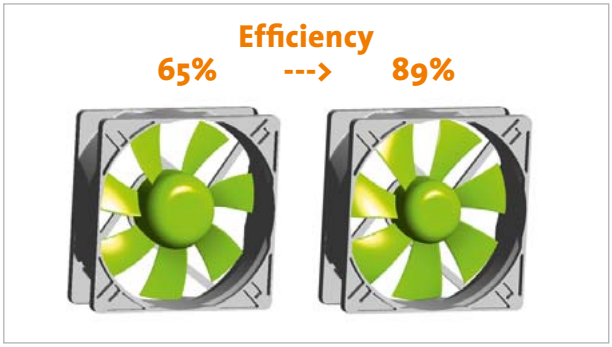
Using optiSLang's CAESES integration in ANSYS Workbench

Coefficient of Prognosis (CoP) and Meta-model of Optimal Prognosis (MOP)

Today, users have access to very powerful parametric modeling environments. As a consequence, the number of optimization parameters has increased. The traditional DOE and Response Surface procedure involves a high amount of manual customization. The user has to reduce the set of variables and choose an appropriate DOE and regression function. Finally, the accuracy of the resulting Response Surface Model has to be tested. Dynardo developed a methodology that supports an automated variable reduction with a reliable quantification of parameter importance. The CoP allows you to filter the relevant input parameters. According to the prognosis capability of the resulting values, optimal meta-models will be selected. These Meta-models of Optimal Prognosis (MOP) represent the most important correlations between parameter input variation and output results. Using an MOP, the sensitivity of different signal properties can be evaluated. Furthermore, an MOP-based optimization can be used to obtain an initial estimation of the optimal parameters. For the final optimization procedure, several algorithms are available in optiSLang. A Best-Practice-Management automatically selects the appropriate optimization algorithms, such as gradient methods, genetic algorithms, evolutionary strategies or Adaptive Response Surface Method.



Sensitivity studies supported by the CoP and optimization using the MOP



Optimized fan with increased efficiency ratio between the power transferred to airflow and the power used by the fan

optiSLang® CAESES®

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