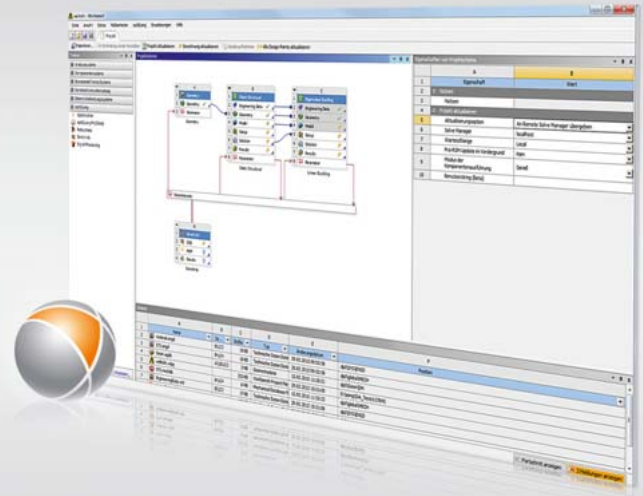




optiSLang[®]

Combining powerful parametric model capabilities with Robust Design Optimization



Computer-Aided Engineering (CAE) enables the investigation of large numbers of product variants or variations in scenarios of product application. This is one of the main strategies to save costs and shorten design development cycles in the virtual product development process.

The combination of ANSYS Workbench, providing leading technology for parametric and persistent CAD and CAE modeling for simulation driven product development and optiSLang, providing efficiency and automation of RDO methods, offer a very powerful environment for virtual product optimization.

Leading edge algorithms for RDO

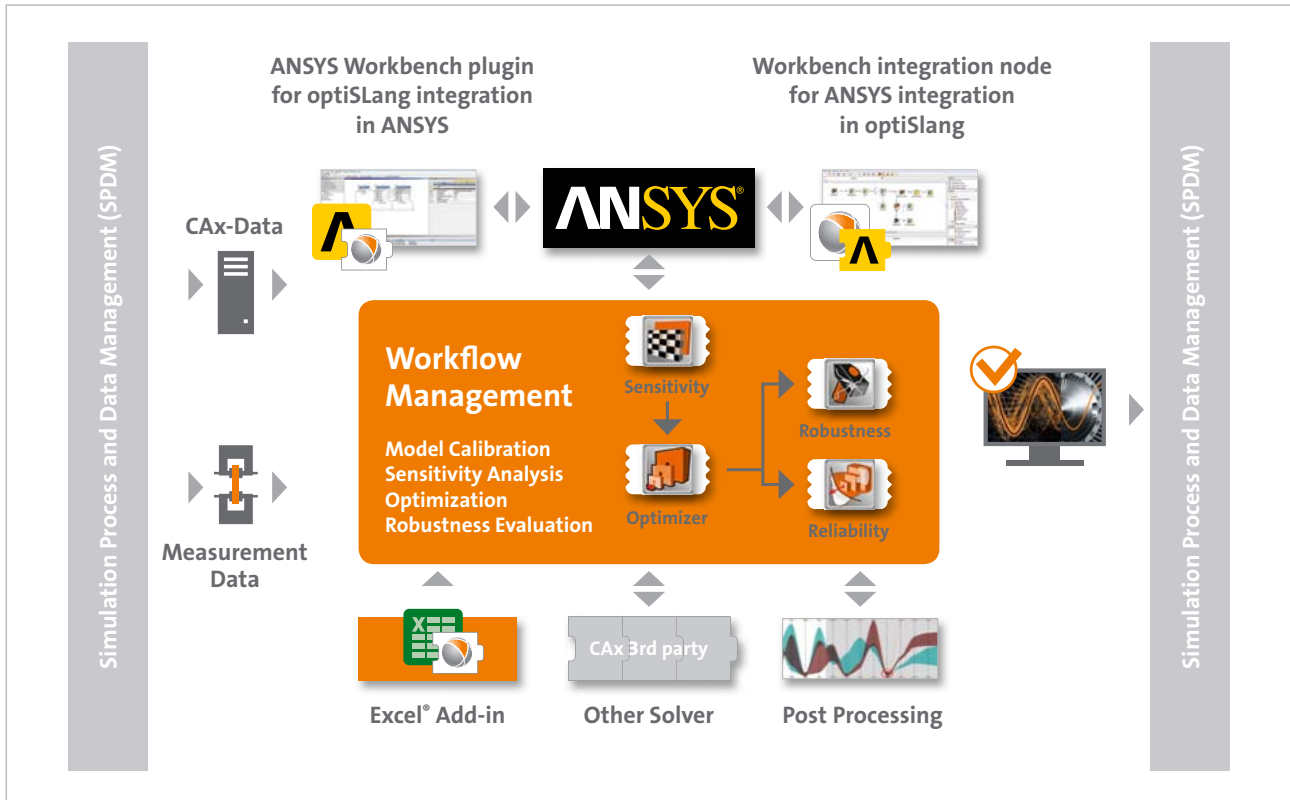
The introduction of CAE-based RDO in virtual product development makes high demands on process automation, parametric virtual models and algorithmic efficiency. Since the product launch in 2001, Dynardo has consequently evolved optiSLang's technology, especially for applications with complex non-linear analysis models including many parameters and stochastic variables. A robust handling of design failures and CAE solver noise was also implemented. Algorithm wizards and user guidance by best practice modular workflows make ANSYS optiSLang an easy and flexible to use software tool for CAE-based product optimization. The innovative technology of the Metamodel of Optimal Prognosis (MOP), containing automatic variable reduction and measurement of forecast quality of the response variation, enable the user to solve challenging RDO tasks efficiently.

CAE integration and process automation

For the generation of suitable CAE parametric models as a key requirement of RDO, ANSYS Workbench has been established as one of the most powerful parametric modeling environments. It includes bidirectional interfaces to major CAD programs and is capable of collecting all available CAE and CAD data in a central parameter ma-

nager. Consequently, the system integration, process automation and job control was also integrated in ANSYS Workbench to update one or multiple designs from the parameter manager. In this context, a direct integration of optiSLang into parametric modeling environments has been developed with the same priority as the integration of external CAE-codes into optiSLang's functionality of process automation. If all parameters are available in ANSYS Workbench, optiSLang's wizards as well as the drag and drop modules of sensitivity analysis, optimization and robustness evaluation can be comfortably used. There is no difficulty anymore to setup and run a variation analysis.

If additional input or output parameters have to be added, signals need to be processed, or third party tools need to be integrated, optiSLang's GUI offers powerful capabilities of integration and automation. For the integration of ANSYS Workbench projects, an ANSYS integration node as well as the text file base communication functionality is available. In addition, optiSLang's graphical programming supports file based process integration, direct access to parametric modeling CAE environments like ANSYS or SimulationX, as well as environments like Excel, MATLAB or Python.



ANSYS optiSLang – Integration Methods

CAx Workflows & SPDM

optiSLang provides various features for efficient parametric modeling and process generation, including the definition and use of templates or sub flows or the customization of user defined algorithms and workflows. Since version 5, gateways to Simulation and Process Data Management (SPDM) have been implemented for the definition and usage of SPDM parametric models and the data exchange with ANSYS EKM or Siemens Teamcenter.

Best Practice Modules

optiSLang provides best practice algorithms with default and wizard guidance for a regular integration of CAE-based RDO methodology in virtual product development. Best algorithms and modular workflow generation are supported by optiSLang's three modules of:

1. **Sensitivity Analysis** to understand the design, to reduce parameter to the most important ones, to check forecast quality of response variation and to automatically generate the best possible meta model
2. **Optimization** to improve design performance
3. **Robustness Evaluation** to verify the design robustness regarding scattering material parameter, production tolerances or varying environmental conditions

The modules can be easily applied with drag and drop functionality. Using wizard-based set up, the user input is reduced to a minimum requiring only the setting of parameter ranges, scatter, constraints and objectives. All algorithm settings are automatically generated with the help of best practice defaults and a wizard guided modular workflow. Within the optimization module, algorithms generate the most efficient and fitting optimization strategy based on the results of a sensitivity analysis and additional user input.

Extensibility

The openness of optiSLang also enables users to plug:

- Algorithms for DOE, Optimization, Robustness etc.
- Meta-models
- Tool integrations
- Database connections

Current requirements for flexibility and upcoming requests for extensibility are satisfied by those interfaces. Therefore, optiSLang is the platform to address future needs of parametric and simulation driven virtual product development.