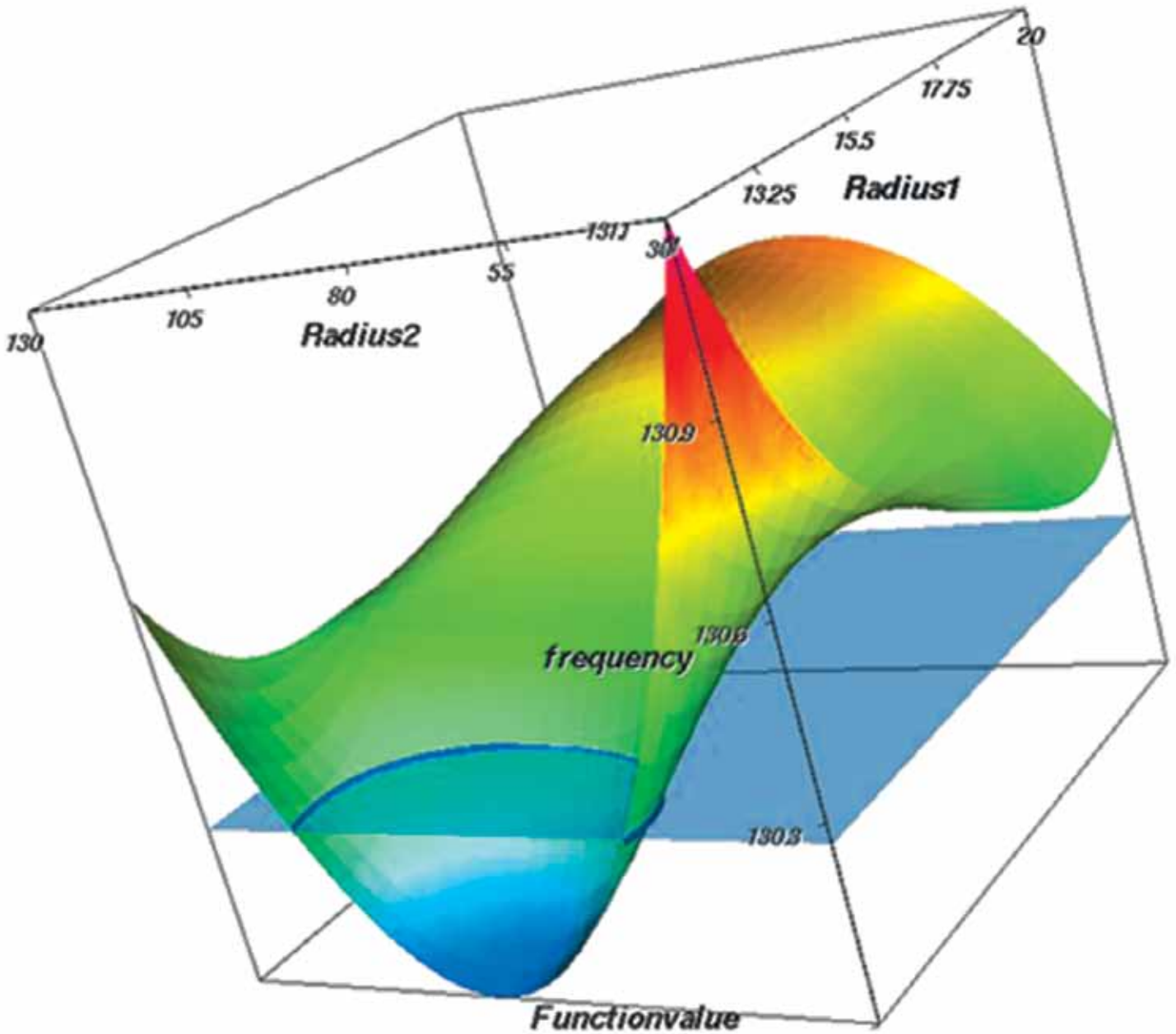


LMS Samtech

BOSS quattro

A new way to explore your design space



 LMS[®]

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BOSS quattro is a complete environment which allows you to explore your design space by providing a set of tools from simple parametric studies to fully automatic optimization. BOSS quattro is designed to answer questions like:

- **Which combination of parameters leads to a suitable response according to the specifications (constraint) ?**
- **What's the impact of some parameters on my design criteria values (sensitivity analysis) ?**
- **Which input parameters values lead to an optimum design according to one or more criteria ?**

TASK MANAGEMENT

BOSS quattro automatic task manager: the best way to save time and money by optimizing your design methodology!

BOSS quattro task manager allows to represent, in a flexible way, large and complex analysis chains.

Tasks and analyses can be combined, launched simultaneously, while managing synchronism between internal engines and external software.

For each study, BOSS quattro generates automatically a HTML report, including analysis summary, design variables and functions characteristics (values and bounds) and curves.

The task organizer lets you manage job distribution, parallelism and/or synchronism of external procedures on several local or remote processors.

STUDIES AND OPTIMIZATION

As soon as BOSS quattro access parameters in your model, following engines are available:

Parametric studies

With parametric studies, BOSS quattro provides you with a set of tools to explore the design space.

Parametric studies using BOSS quattro: the easiest way to achieve better design by automatic design space exploration.

Sensitivity analysis

Thanks to the sensitivity analysis, you can compare the effect of several parameters on given responses.

Monte Carlo method

The Monte Carlo method allows you to deal with statistical parameters and answer questions like "What is the probability of failure ?" or "What is the probability the displacement of that node is greater than a given limit ?".

Statistical analyses allow to study the effects of the parameters' statistical variations on the model behavior.

Optimization and updating

BOSS quattro offers you the "best-of-class" algorithms to converge very quickly to most pertinent evaluations and reach an optimum.

Such algorithms open new exploitation fields nearby optimization, which can be combined to offer you, in one environment, the most powerful tools:

- Research of the best design according to a set of constraints (optimization);
- Model updating;
- Research of the best solution from a set of designs already computed.

Design of experiments methods

Design of experiments methods help you to understand the physical problem and to evaluate the effects of selected parameters in order to optimize the design of your model. You can choose among a list provided by BOSS quattro, the most suitable DOE for the analysis you want to lead (i.e. user-level factorial design, Taguchi table...).

Response surfaces

They are obtained by model approximation (Posynomial and Polynomial schemes) using previously calculated points coming from DOE.

Optimization of such surfaces (explicitly defined w.r.t. the design variables) is particularly fast. Visualization tools and analysis features help designers to select the most suitable alternative.

Response surfaces allow you to perform complementary analysis without rerun parts of analysis, reducing drastically analysis time and costs. It can also be used as a quick approach leading to a more accurate optimization.

Database and interpolation

BOSS quattro allows to store all points computed by its internal engines in order to:

- Re-use them without new analysis, if needed;
- Identify the «best point»;
- Use them to build interpolation functions Radial Basis Functions, Krig Functions or neural network.

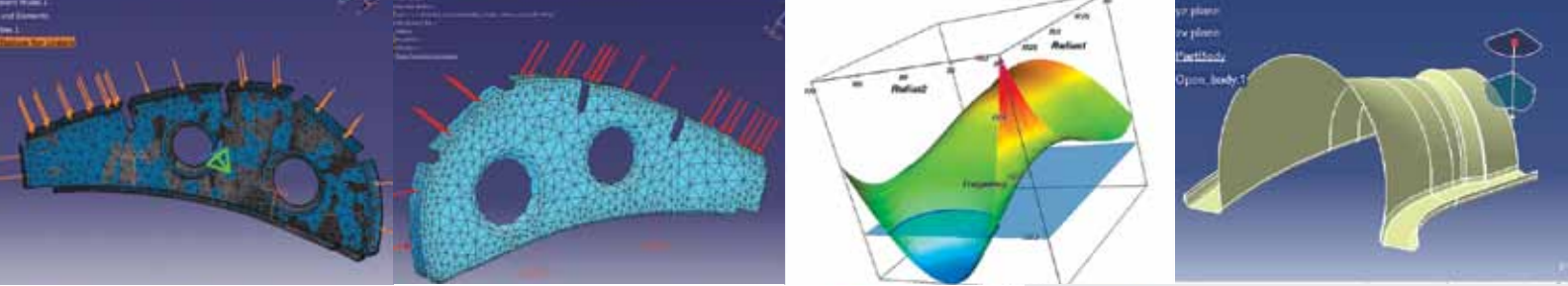
INTERFACES

BOSS quattro is designed to work at the CAD level by recognizing sets of functions (i.e. ready stresses, displacements...) based on geometrical entities. Consequently, the problem definition remains coherent even in case of remeshing after iteration.

BOSS quattro interfaces are available in standard, freeing you from writing any line of code, but provides also neutral interfaces allowing you to couple quickly your "in-house" applications.

Moreover, you can customize your optimization environment just by selecting the requested drivers to interface with the CAD or FEA software you use (i.e. CATIA V4 & V5, SAMCEF, SAMCEF Field, MSC NASTRAN, ABAQUS, EXCEL...).

Its native interfaces with major CAE and FEA systems make BOSS quattro the perfect complement, enlarging basic capabilities of those systems.



OPTIMIZATION ALGORITHMS

The strong point of BOSS quattro is to provide powerful optimization algorithms, which can solve complex problems combined or not, such as gradient methods (CONLIN, SQP, GCM, etc.) or genetic algorithms:

- Multi-objective problems with user-driven objective weight;
- Constrained or unconstrained problems;
- Feasible design search;
- ...

Genetic algorithms (i.e. the zero-order algorithm) broaden BOSS quattro application and let you manage new kinds of problems:

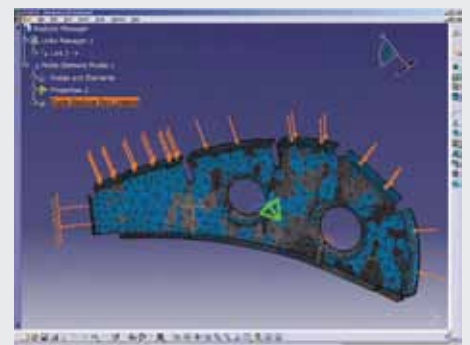
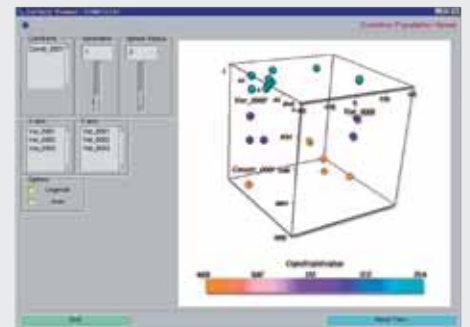
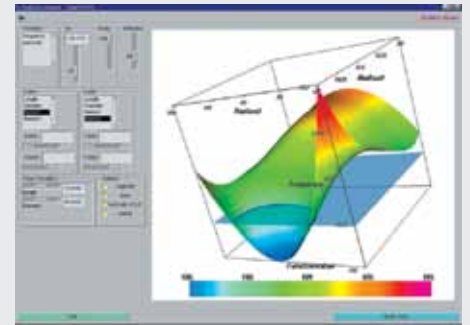
- With discrete variables, even integer or non- numerical design variables;
- Discontinuous functions;
- Global optimum search.

DOCUMENTATION

For direct access to information, the Users Guide and Help manual (including many examples) are available via your favorite navigator (HTML).

PLATFORMS

BOSS quattro is available on most Unix, Linux and Windows platforms.





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