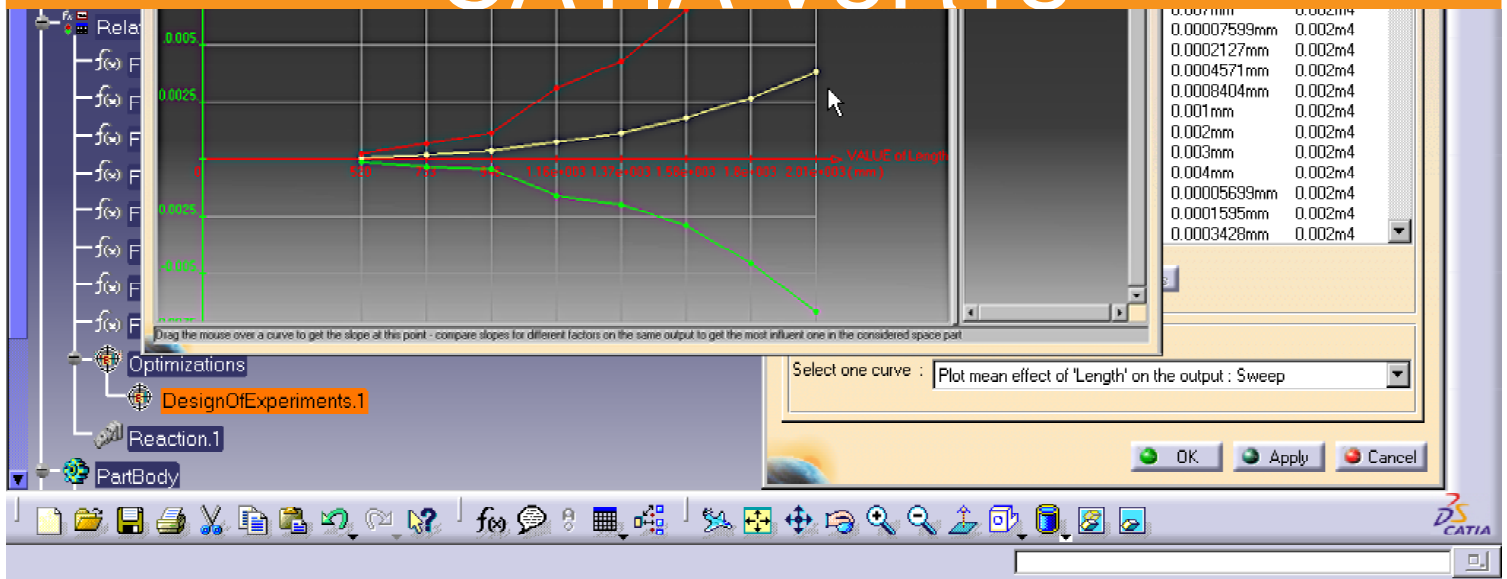


Product Synthesis

# CATIA - Product Engineering Optimizer 2 (PEO)

## CATIA V5R18





## Product Synthesis

# CATIA - Product Engineering Optimizer

Accelerates design alternatives exploration and optimization according to multiple requirements.

### Product overview

CATIA - Product Engineering Optimizer 2 (PEO) allows users to explore additional design alternatives and accurately optimize designs utilizing two complementary tools : Design Of Experiments (DOE) & Design by Goal.

#### Design Of Experiments:

It's clearly difficult to assess and quickly determine the best configuration for a design because of the numerous combinations of parameters (such as lengths, masses, deformations, etc...).

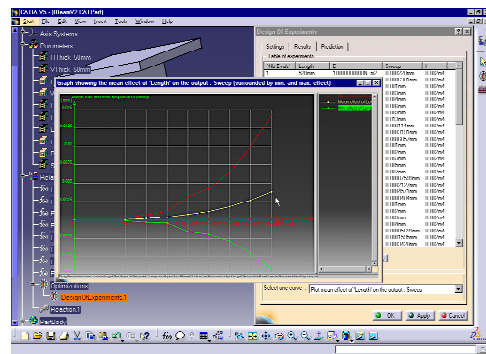
CATIA - Product Engineering Optimizer 2 (PEO) enables users to perform virtual experiments taking into account as many parameters as required. Thus, Design Of Experiments allows users to:

- >Evaluate interactions between parameters,
- >Make parameter predictions, and
- >Identify which parameter is the most influential.

DOE is a natural and efficient way to explore and optimize design. It allows users to estimate an optimal design with a few computations and also perform better, faster optimizations. DOE dramatically reduces the number of design iterations avoiding costly redesign and increasing productivity.

#### Design by Goal:

CATIA - Product Engineering Optimizer 2



(PEO) helps define optimization targets and means for multidisciplinary specifications. Objectives, captured interactively, drive the system to determine an optimal solution for designs with many variables and criteria. Objectives are embedded into CATIA V5 documents and leveraged through sharable, integrated and automated goal-driven specifications. Real-time feedback and outputs are provided to satisfy users' requirements for immediate assessment or analysis.

As part of the native capacity of Version 5 products and architecture to dynamically capture design specifications, CATIA - Product Engineering Optimizer 2 (PEO) delivers a unique way to specify objective-driven specifications.

As an integrated product, CATIA - Product Engineering Optimizer 2 (PEO) can be used in conjunction with all other Version 5 products to increase design performance.

## Product Highlights

- ☒ **Accelerates exploration of design alternatives through the use of Design Of Experiments.**
- ☒ **Performs multi-discipline and multi-goal design optimization.**

## Product Key Customers Benefits

### Accelerates exploration of design alternatives...

- ☒ **Quickly and easily perform virtual experiments...**

At any stage of the design process, utilizing Design Of Experiment, users can easily and quickly carry out virtual design experiments testing a variety parameters. Using an interactive panel the user selects the parameters to alter and observe. The number of input and output parameters allowable is infinite. This panel also guides the designer through the various validation stages to obtain a result, which will ultimately lead to the final design.

- ☒ **Define cause-effect relationships between parameters...**

DOE allows the designer to perform a large number of experiments. From the experimental results, the software determines the relationship between the various parameters. Thus, it guides the user toward improvements and provides accurate predictions of values. All the results can, then, be backed up for future re-use.

- ☒ **Identify key parameters...**

From these experiments, the designer can learn which parameters are the most influential, facilitating better alternative design searches and optimizations.

### Multi-disciplines and Multi-goals Design optimization...

- ☒ **Capture optimization intent ... This is done through a variety of interactions:**

>Define optimization goal: a given parameter can be specified as a target for

optimization with four possible outcomes:

- minimization: the system will attempt to reach the lowest value
- maximization: the system will attempt to reach the highest value
- objective value: In this case, the user sets the desired value
- constraint satisfaction: the system will attempt to reach one, or several, constraints.

Constraint satisfaction can be mixed with any of the other optimization parameters to perform a multi-goal design optimization.

>Define optimization means: Some parameters can be selected as free (they can be modified to achieve optimization goals) and their domains can be constrained by range.

>Define optimization constraints: Users can not only specify parameter ranges (minimal & maximal boundaries) to be considered during optimization but also constraints to be fulfilled by the optimal solution provided

>Specify the optimization algorithms and the termination criteria: Optimization can be multidisciplinary. For example, goals can include cost, volume, time, etc, and these goals can be driven by any V5 relationships.

>It's also possible to apply importance priorities on constraints allowing both a better control of the resolution, the solving of over-constrained systems and more flexible post-optimization result analysis tools.

In addition, CATIA - Product Engineering Optimizer 2 (PEO) allows users to solve constrained hybrid set of equations, mixing engineering and design, for wider and more complete optimizations.

All the information used is saved as a feature and can be reused later

- ☒ **Multiple optimization options and computation termination criteria...**

Two algorithms are available, the simulated annealing and conjugate gradient. Users can employ both to iterate optimization. Termination criteria can be

defined to stop evolutions. Both algorithms consider time and maximum number of evolutions. The number of evolutions without improvement affects simulated annealing, while precision is only relevant for the gradient. In any case, termination criteria have default values that can work in most cases.

ENOVIA V5 VPM as relational data. Users can then take advantage of the ENOVIA V5 VPM capabilities in terms of storage security, BOM management, versioning, work flow, concurrent engineering while keeping all the knowledge previously captured in the design.

#### **Progress bar displayed with optimization information during the optimization...**

The user can stop optimization at any time if the resulting solution is convenient or reached before the time limit. Users get immediate feedback during optimization, including convergence, update counts and geometry changes in the 3D view.

#### **Real time feedback...**

Real-time feedback and customizable outputs deliver an immediate assessment on the optimization:

- Initial result is provided by a dialog box that allows validation and direct application of new values in design. If needed, optimization data (values of parameters in all evaluations) can be stored in text or Excel files,
- Graphical editor allows visualization of the evolution of variables and the objective value through curves, with different color scales,
- Users can save the result and restart from this point for the next optimization.

Outputs allows users to analyze the problem and select an alternate optimization solution.

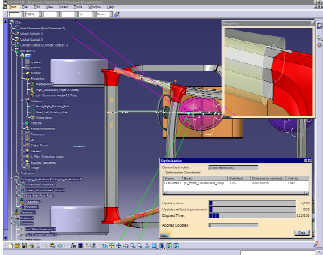
#### **Batch mode capability...**

Users can run an optimization in batch mode. This can be done through the automation of the optimization feature (VB access), and is especially useful for time consuming problems.

### **PLM Integration**

All the knowledge relations including Optimizations, Design of Experiments and Constraint Satisfaction can be stored in

Other images



## ABOUT CATIA V5R18

CATIA is Dassault Systemes' PLM solution for digital product definition and simulation.

**[plm.3ds.com/CATIA](http://plm.3ds.com/CATIA)**

