



EXPLORE DESIGN PERFECTION



ESTECO WEBINAR SERIES

Introducing modeFRONTIER 2016

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>> AGENDA & PRESENTERS

- ESTECO Introduction
- mF2016: new Concept and new Modules
- mF2016: Profiles
- Process & Optimization area
- Data Space area



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ESTECO



Alberto Clarich
Technical Manager
ESTECO





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ESTECO WEBINAR SERIES

Introducing modeFRONTIER 2016

About ESTECO

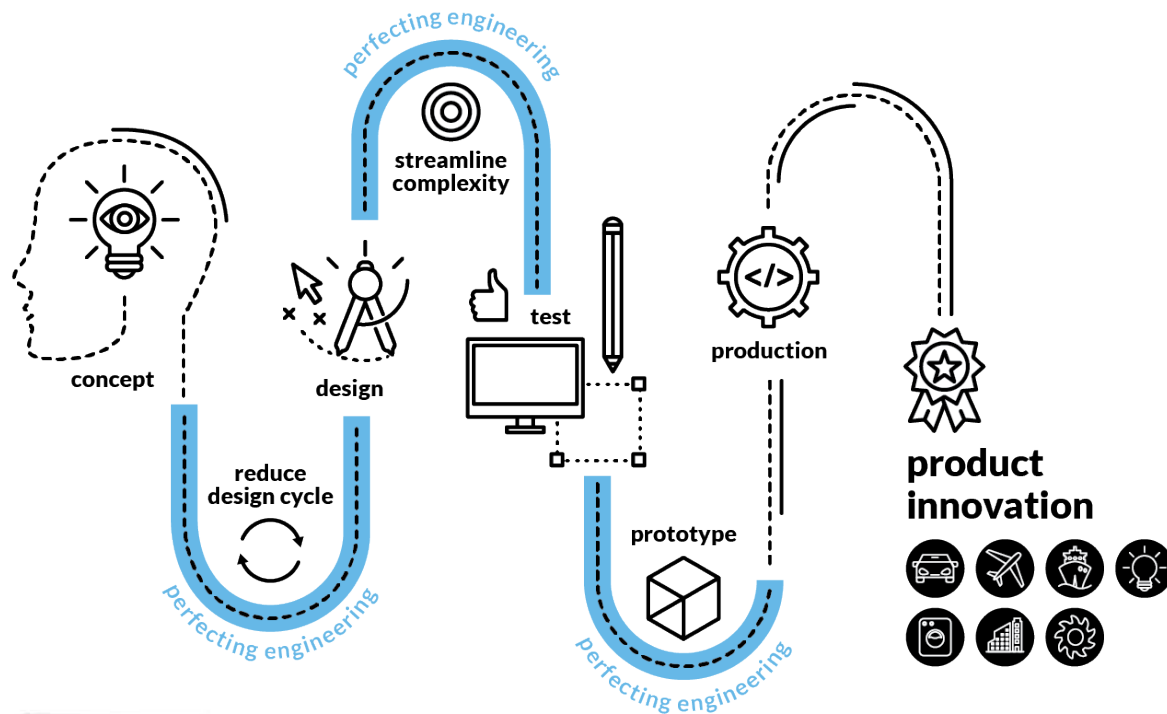
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>> About ESTECO



ESTECO is an independent technology provider delivering first-class software solutions aimed at perfecting the simulation-driven design process. With more than 15 years' experience, we support engineers and companies in designing better, more efficient products.



We specialize in customer-focused solutions for numerical optimization, CAE integration, process automation and simulation data management.





ESTECO clients

Over 300 international clients have relied on our software to design better and more efficient products across a wide spectrum of industrial sectors.

aerospace

architecture engineering & construction

automotive & transportation

biotech & pharma

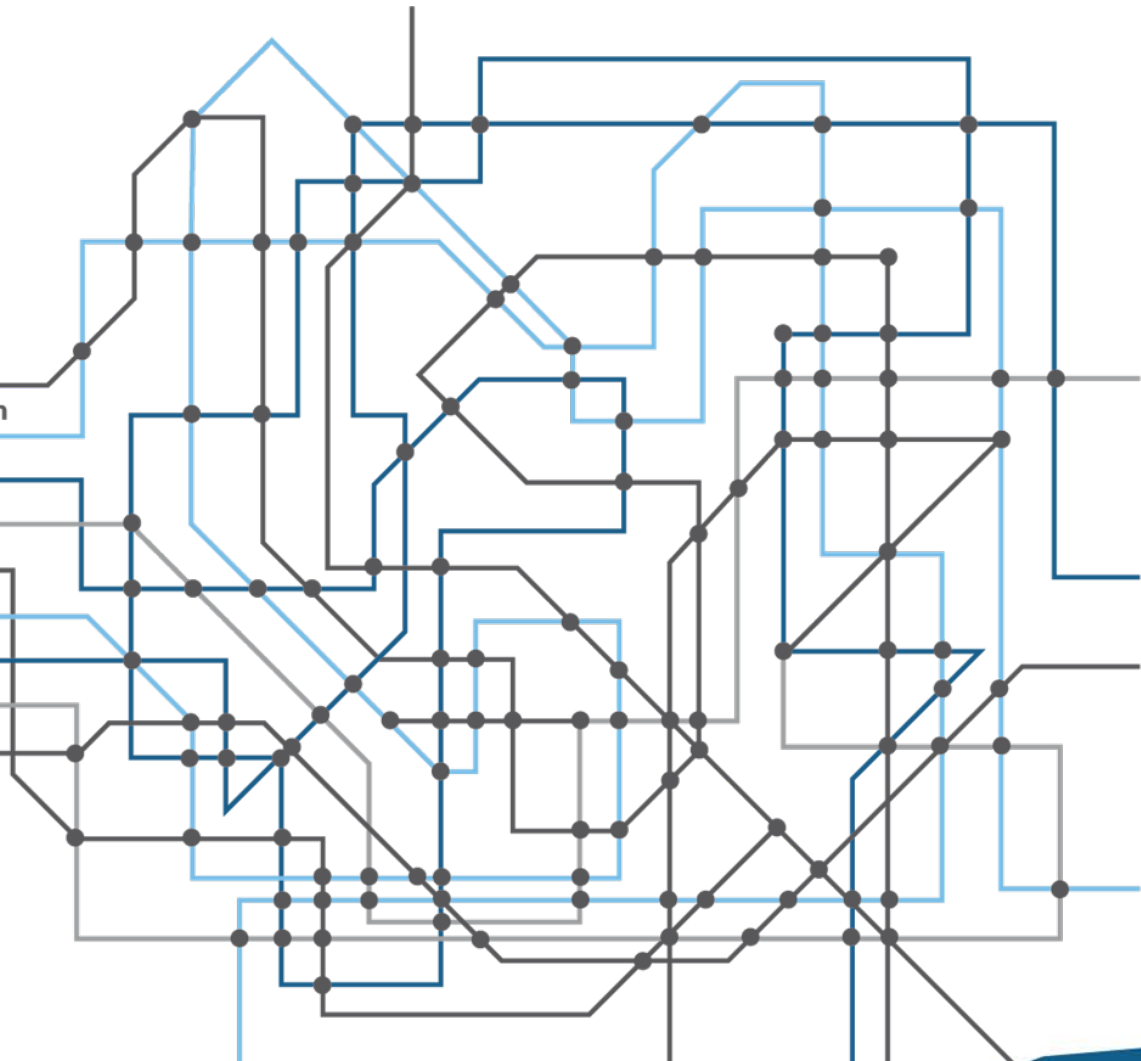
consumer goods

electronics

energy & environment

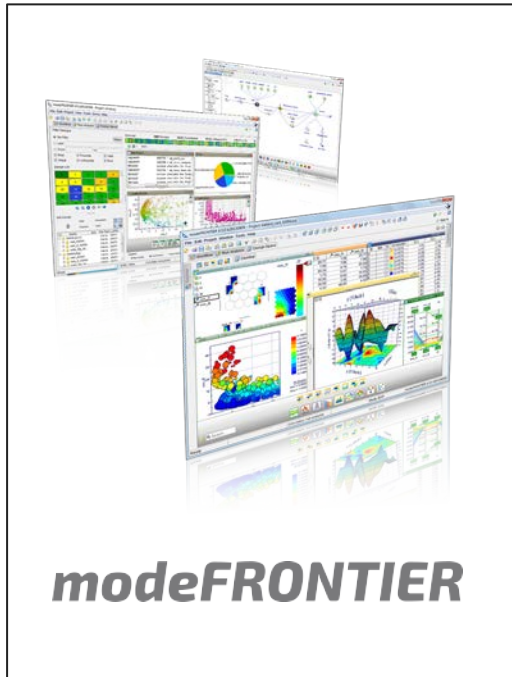
industrial equipment

marine & off-shore



>> ESTECO Technology

Our aim is to **decrease the tedium** in engineering analysis and **increase creativity** by developing and maintaining **cutting-edge software** that enables integration, optimization and advanced data analysis.

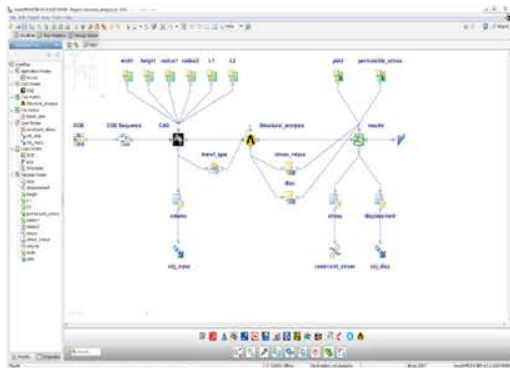


Our first-class technology

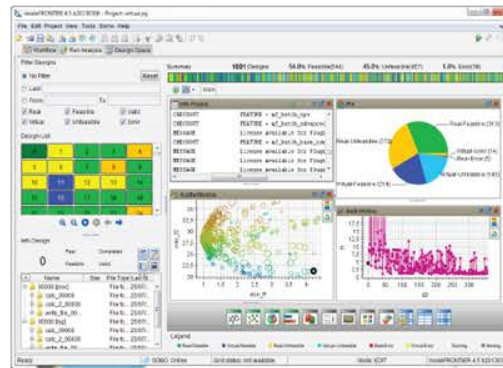


What can you do with modeFRONTIER

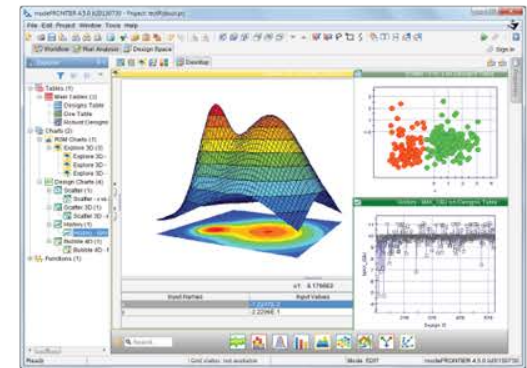
INTEGRATION AND PROCESS AUTOMATION



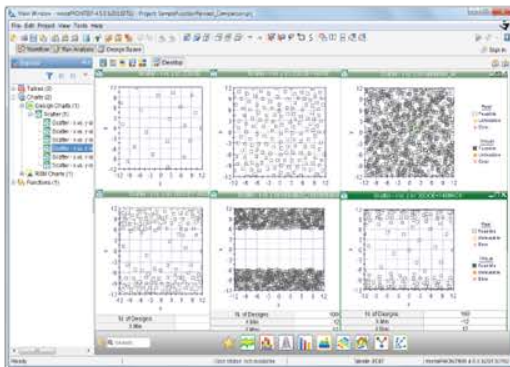
OPTIMIZATION AND RESPONSE SURFACES



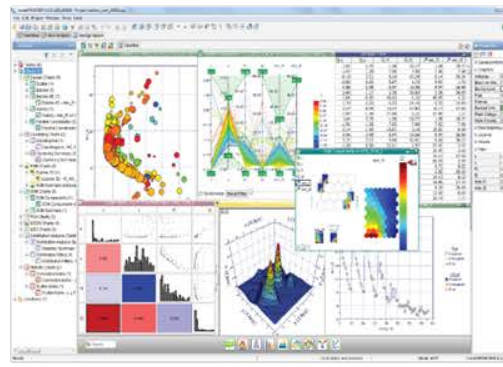
ROBUST DESIGN AND RELIABILITY



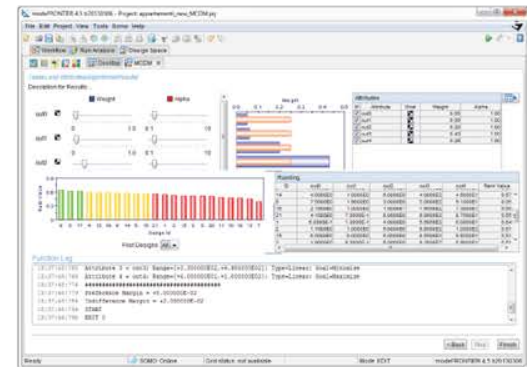
DESIGN SPACE EXPLORATION



ANALYTICS AND VISUALIZATION



DECISION MAKING





EXPLORE DESIGN PERFECTION



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Concept

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modeFRONTIER2016 Viewpoint

**Consolidate
specialized
expertise *and*
streamline
teamwork**

Improving efficiency

- ✓ Tailored access to functions
- ✓ Flexible team-focused licensing

Reducing complexity

- ✓ Workflow management
- ✓ Customized views

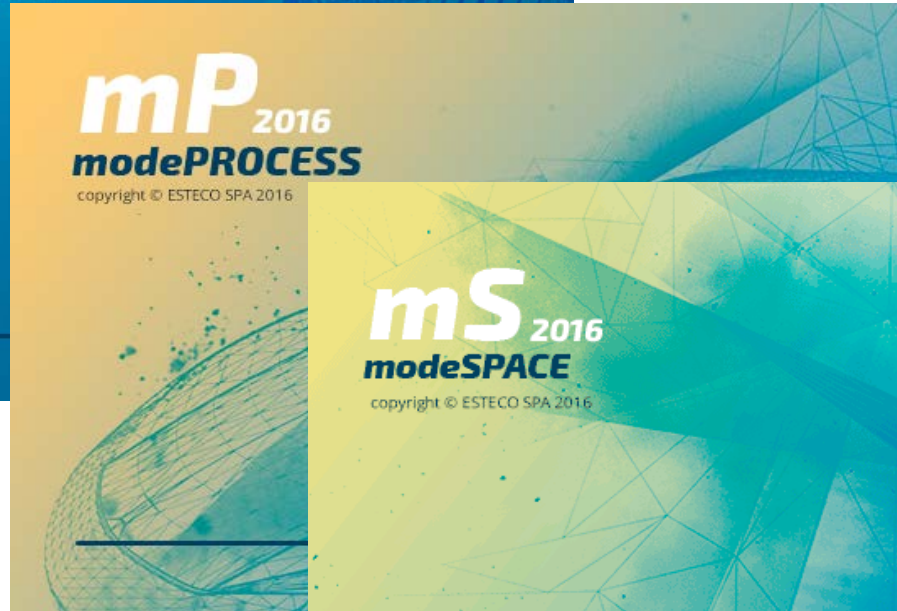
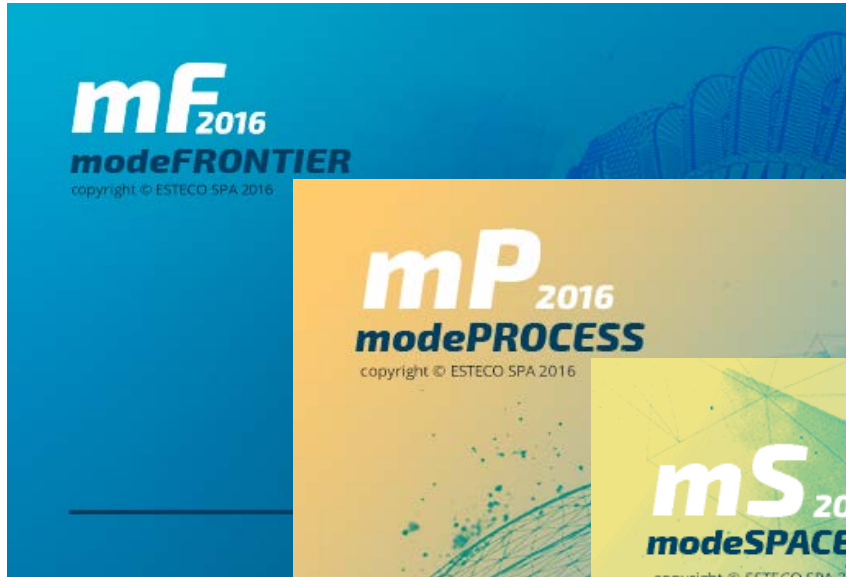
Cutting development time

- ✓ Programmatic access to Design Space functions
- ✓ Enhanced wizards for key functions





modeFRONTIER2016 Modular Environment





EXPLORE DESIGN PERFECTION

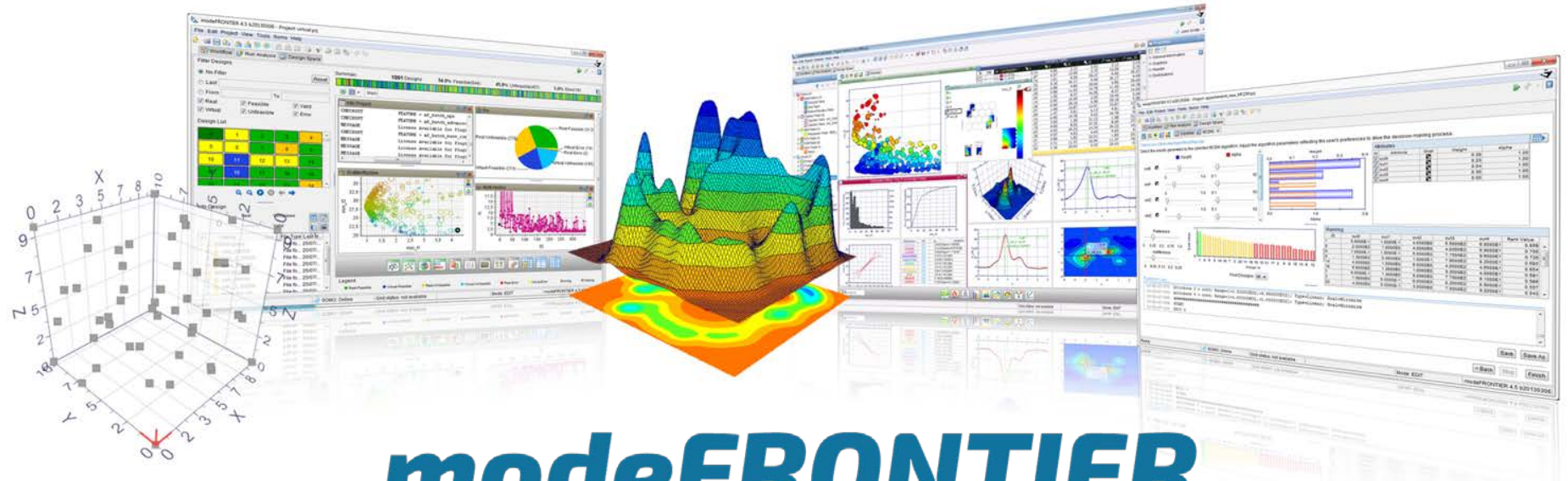


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Modules

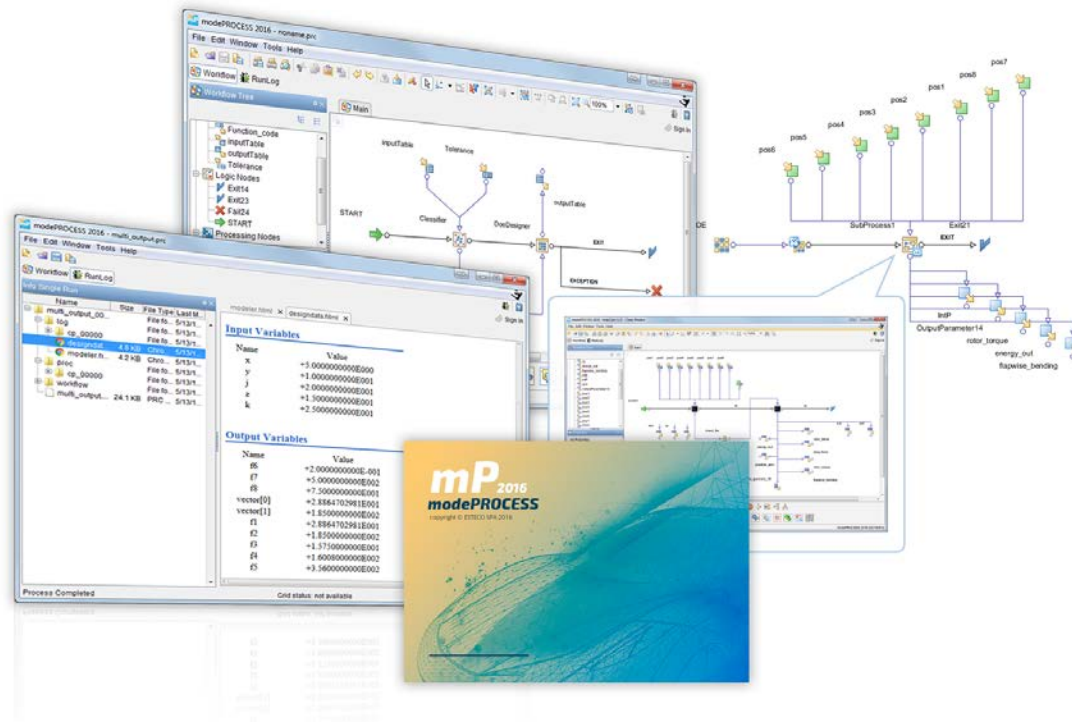
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modeFRONTIER

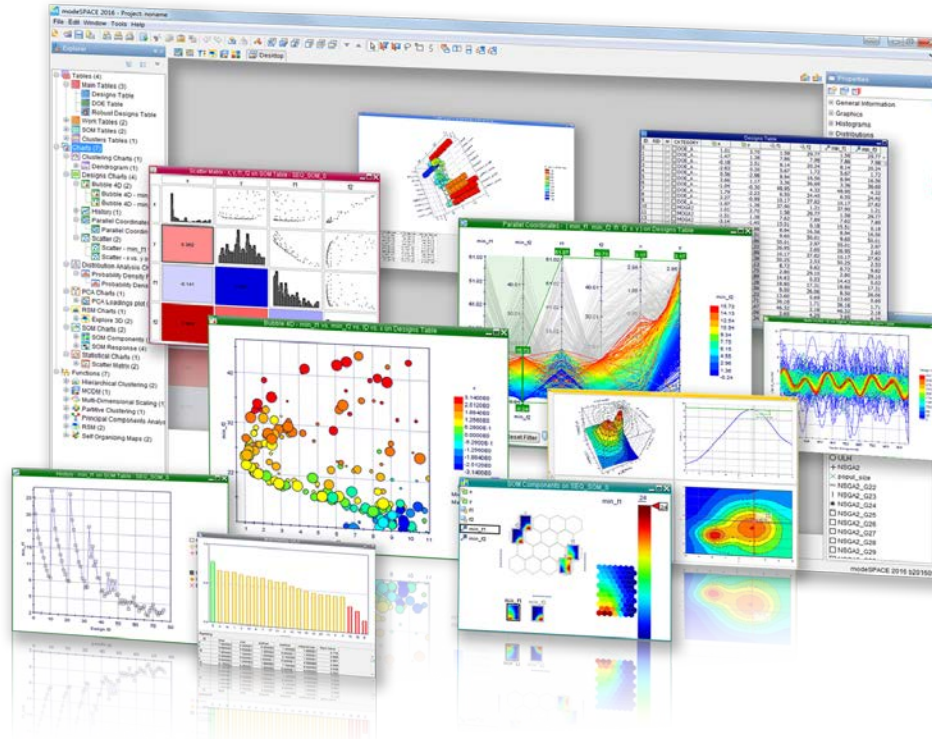
Streamlines the design process with powerful workflows, innovative algorithms and sophisticated post-processing tools. Its multidisciplinary design enabling technology, keeps it at forefront of engineering technology.



modePROCESS

Independent desktop application useful to describe processes in the form of graphical workflows, by specifying which parameters and calculations are required to solve a design problem.





modeSPACE

Includes the sophisticated set of modeFRONTIER tools for data analysis and problem investigation and support to decision making, both in the pre-optimization and in the post-processing phase.



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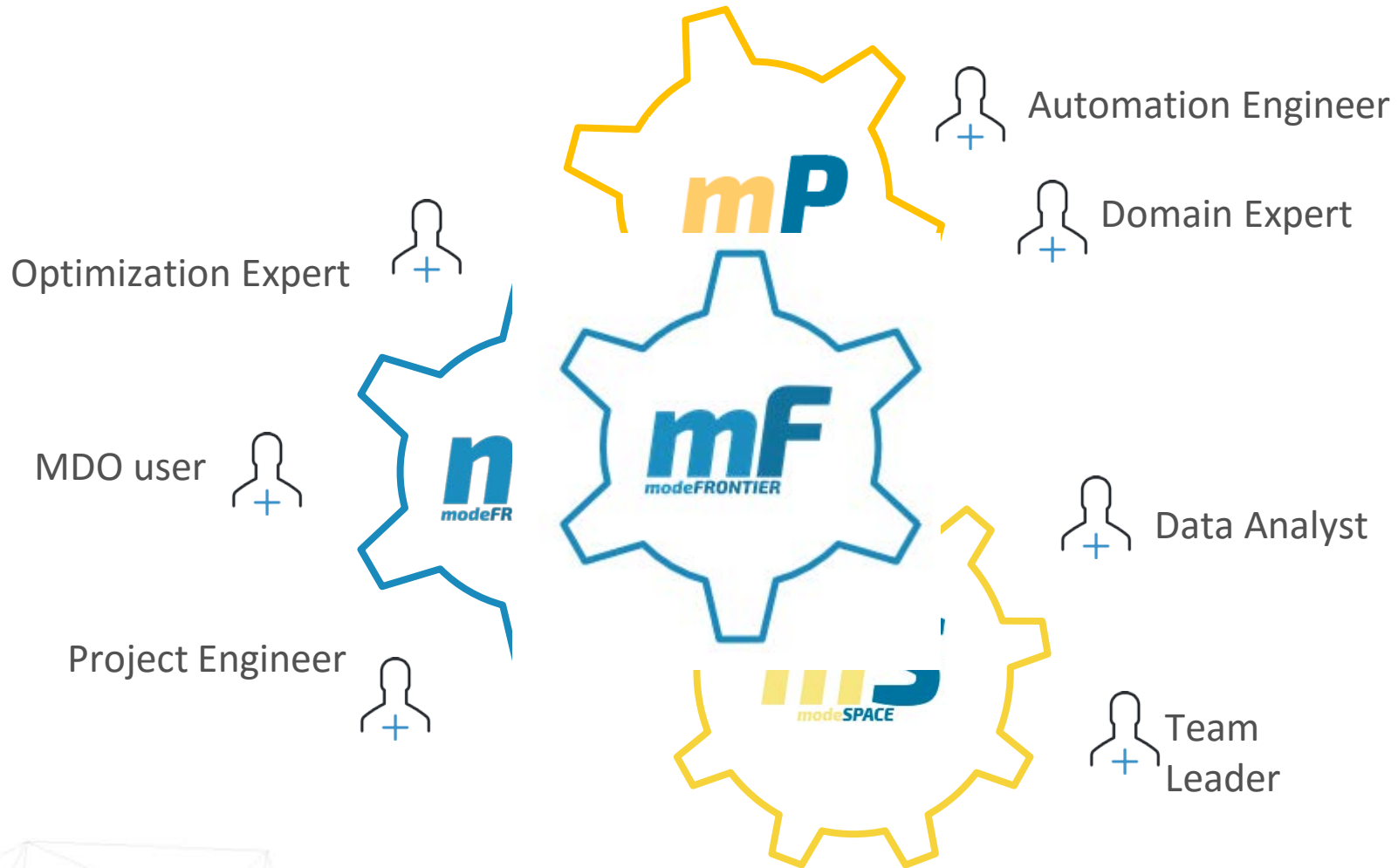
Profiles

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license and role management streamlined





PROFILES > focus on teams and roles

DATA SPACE

PROCESS AND OPTIMIZATION

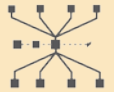
DATA VIEWER

UNDERSTAND COMPLEX DATASETS IN modeSPACE



AUTOMATION DESIGNER

GET YOUR MDO WORKFLOW INTO SHAPE



DATA INSPECTOR

UNDERSTAND COMPLEX DATASETS IN THE modeSPACE



SINGLE DISCIPLINE DESIGN

ENHANCED DESIGN SOLUTIONS FOR DOMAIN EXPERTS



DATA INTELLIGENCE

POST-PROCESSING ESSENTIALS AT YOUR FINGERTIPS



MULTI DISCIPLINE DESIGN

UNLOCK THE POWER OF MDO



DATA EXPLORER

MAKE THE MOST OUT OF ADVANCED DATA ANALYSIS



OPTIMEAZY

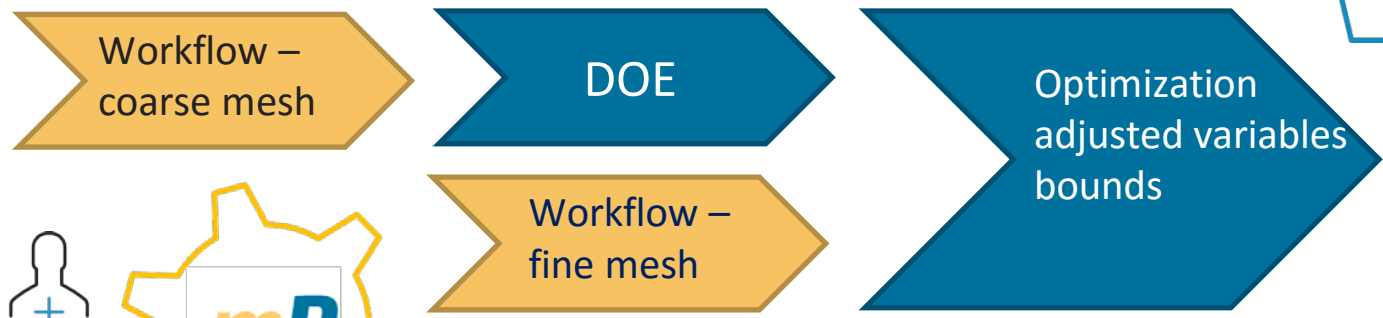
FIND THE OPTIMUM WITH ONE CLICK




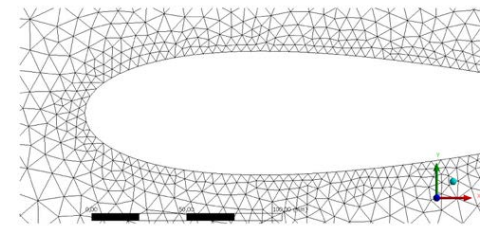
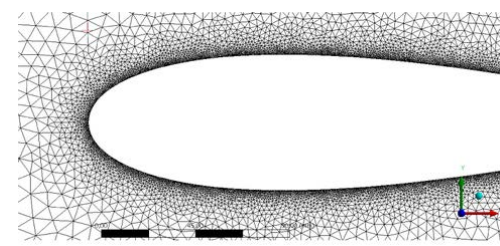
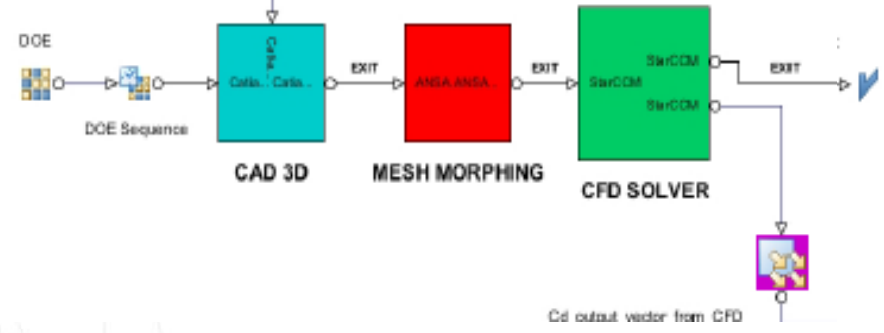
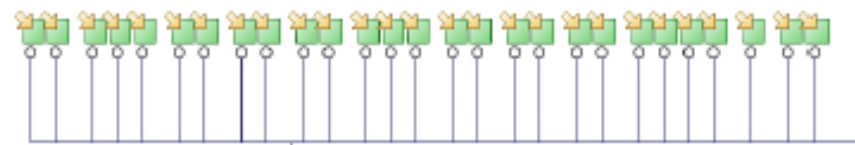


Modular access to functionalities – scenario 1

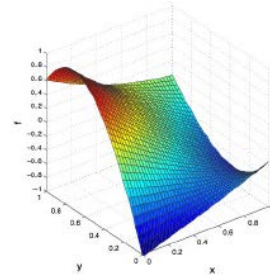
Optimization Expert 



Automation Engineer 



Modular access to functionalities – scenario 2



Data Analyst

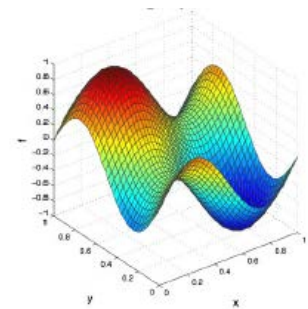
three wheeler DOE

three wheeler RSM



motorcycle DOE

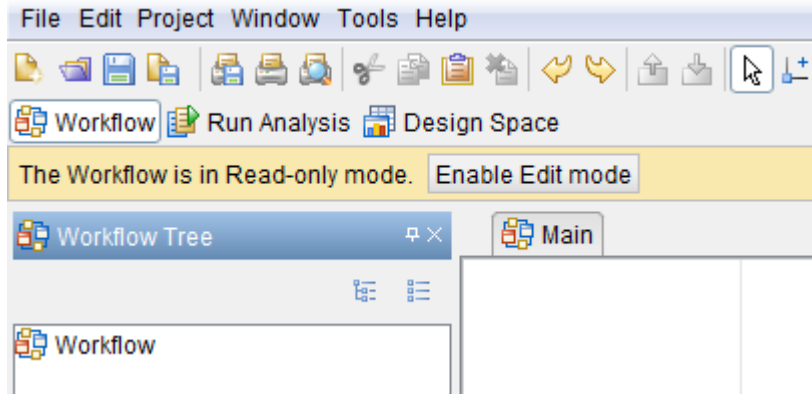
motorcycle RSM



Optimization Expert



>> Efficient license handling for workflow and design space



mF2016 news:

mF license contains two separated Workflow and DesignSpace keys, which can be enabled/disabled

Advantage:

Two users can simultaneously access same mF license, working on the two environments (keys) separately

mF
modeFRONTIER

mP
modePROCESS

mS
modeSPACE





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Data Space

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>> focus on teams and roles

mf
modeFRONTIER

mp
modePROCESS

ms
modeSPACE

DATA VIEWER



Analytics Charts
VIEW

DATA INSPECTOR



Analytics Charts
VIEW & EDIT

DATA INTELLIGENCE



Analytics Tools
VIEW & EDIT

DATA EXPLORER



Analytics Tools
Design Space Exploration
VIEW & EDIT

UNDERSTANDING
DATA TRENDS AND ATTRIBUTES
IMPACTING THE DESIGN SPACE

- ✓ design space exploration
- ✓ sensitivity analysis
- ✓ response surface modelling
- ✓ post-processing
- ✓ large dataset analysis

>> Automatic RSM Training mode

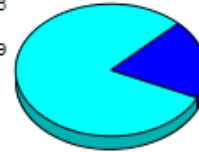
Going straight from data to RSM with **less clicks** and **less parameter settings**

1. Choose the Table

Name	Size	Type
Designs Table	3113	
Designs Table_Training	36	
Designs Table_Validation	4	
pareto	90	

Selected Table

Total	38
Real	7
Real(Broken)	29
Virtual	0
Virtual(Broken)	0
Error(Real)	0
Error(Virtual)	0



Choose output variable Choose input variable Choose the algorithm

def
 stress
 weight

a
 b
 c
 dens

Polynomial SVD
 Stepwise Regression
 Shepard - K-Nearest
 Kriging
 Anisotropic Kriging

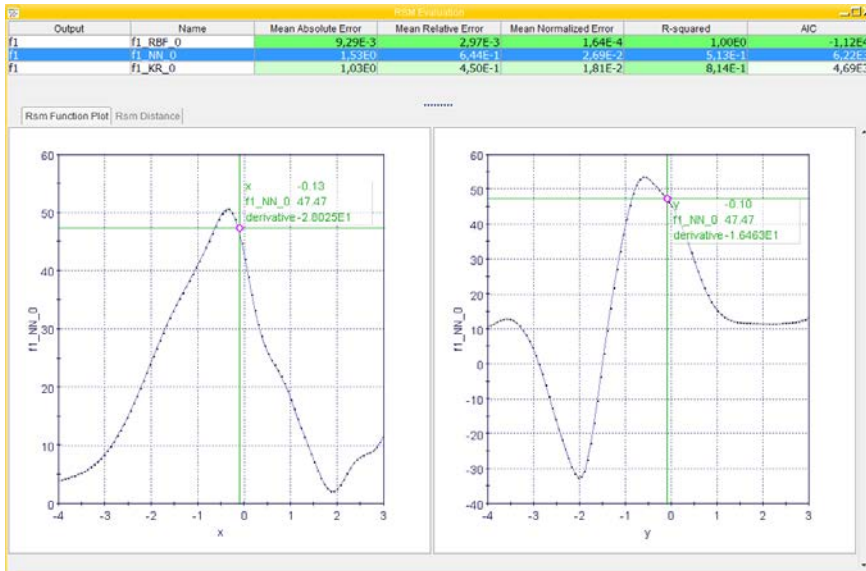
Enable RSM validation - Criterion for favorite selection: Mean Normalized Error
Validation Config
 Use existing table for validation Robust Designs Table

guided training process

- ✓ Saving time
- ✓ Easier and faster editing
- ✓ Manual RSM training wizard still available

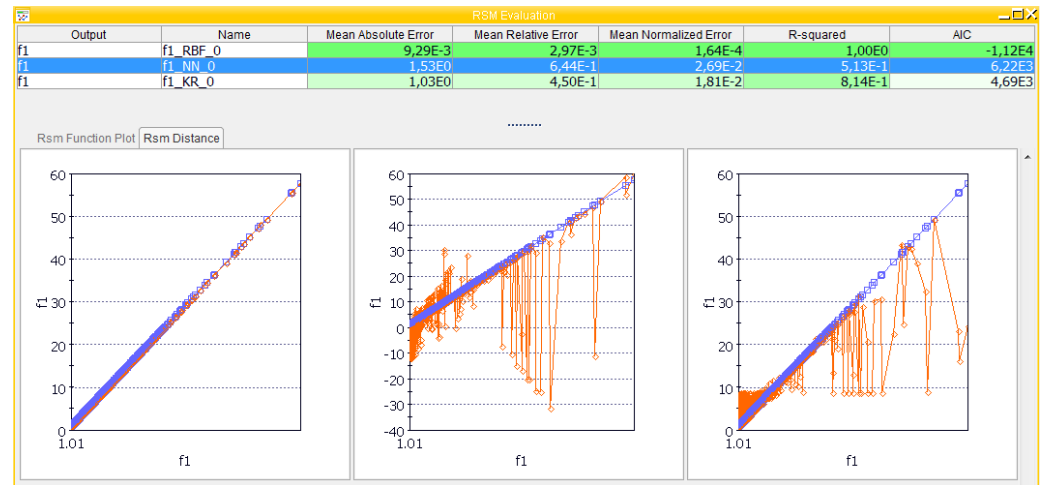


>> RSM Evaluation chart

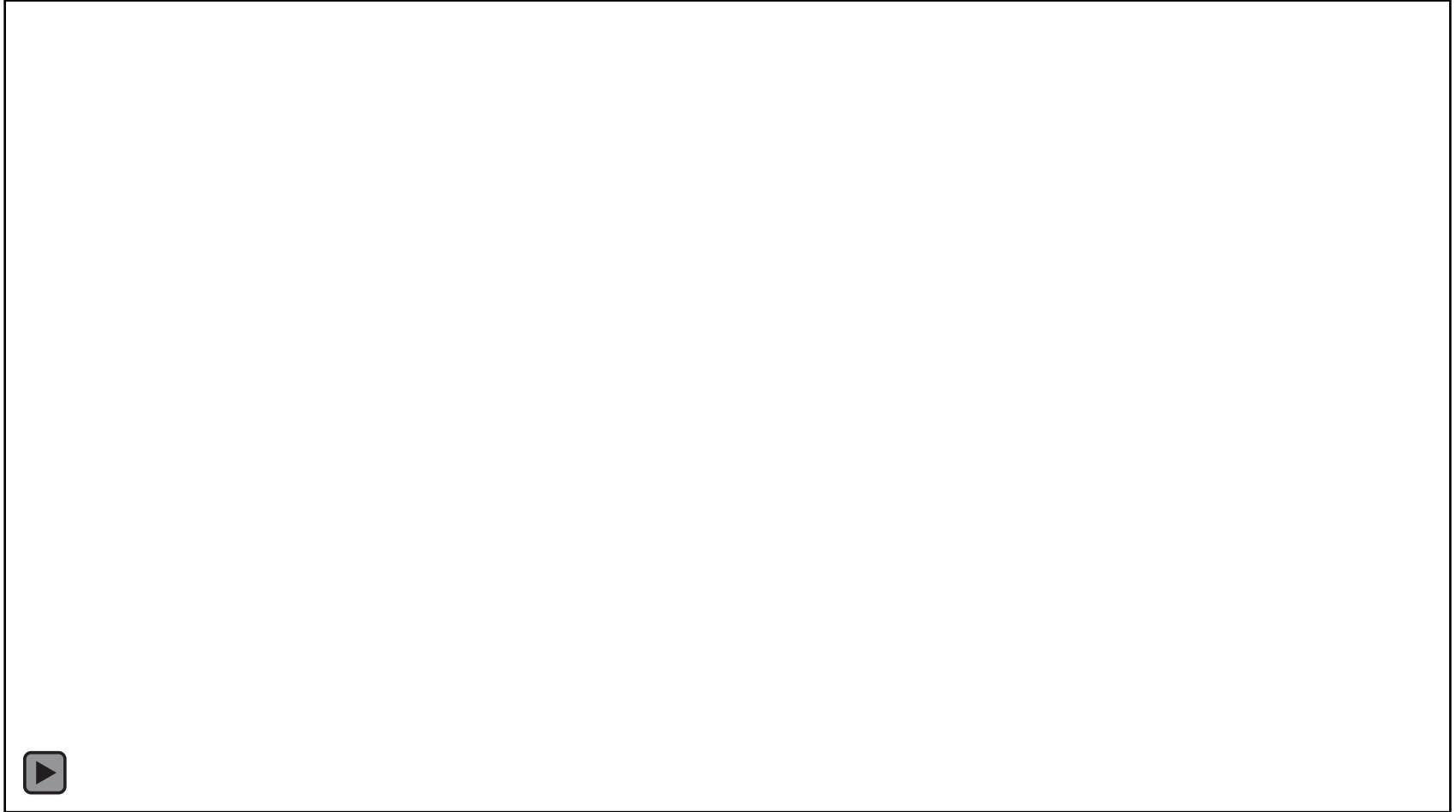


All-in-one chart showing relevant information for the quality evaluation of many RSMs

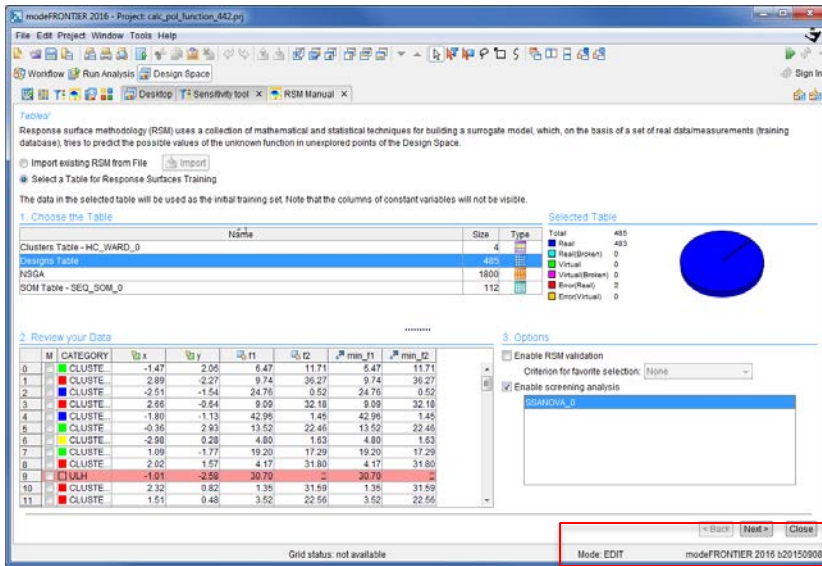
Useful to compare multiple RSMs, selecting the best model



>> Automatic RSM Training mode

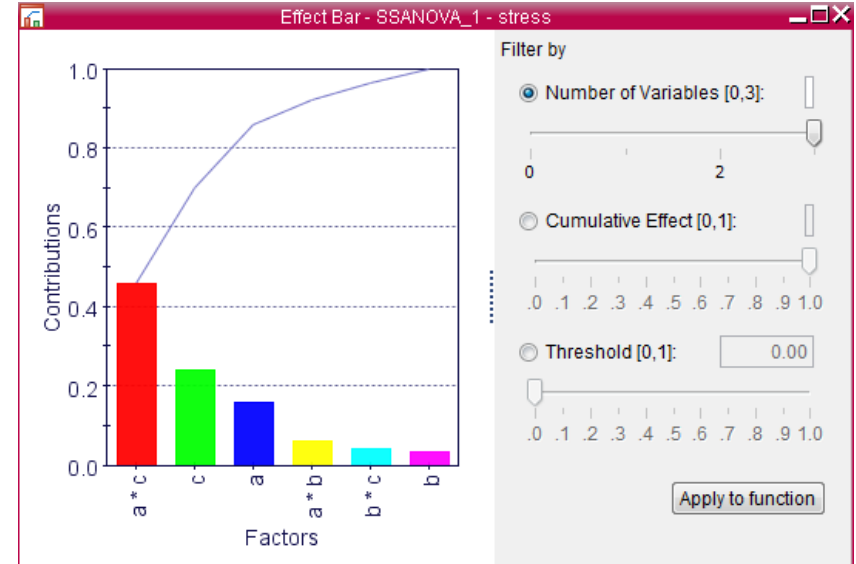


>> Sensitivity Analysis tool

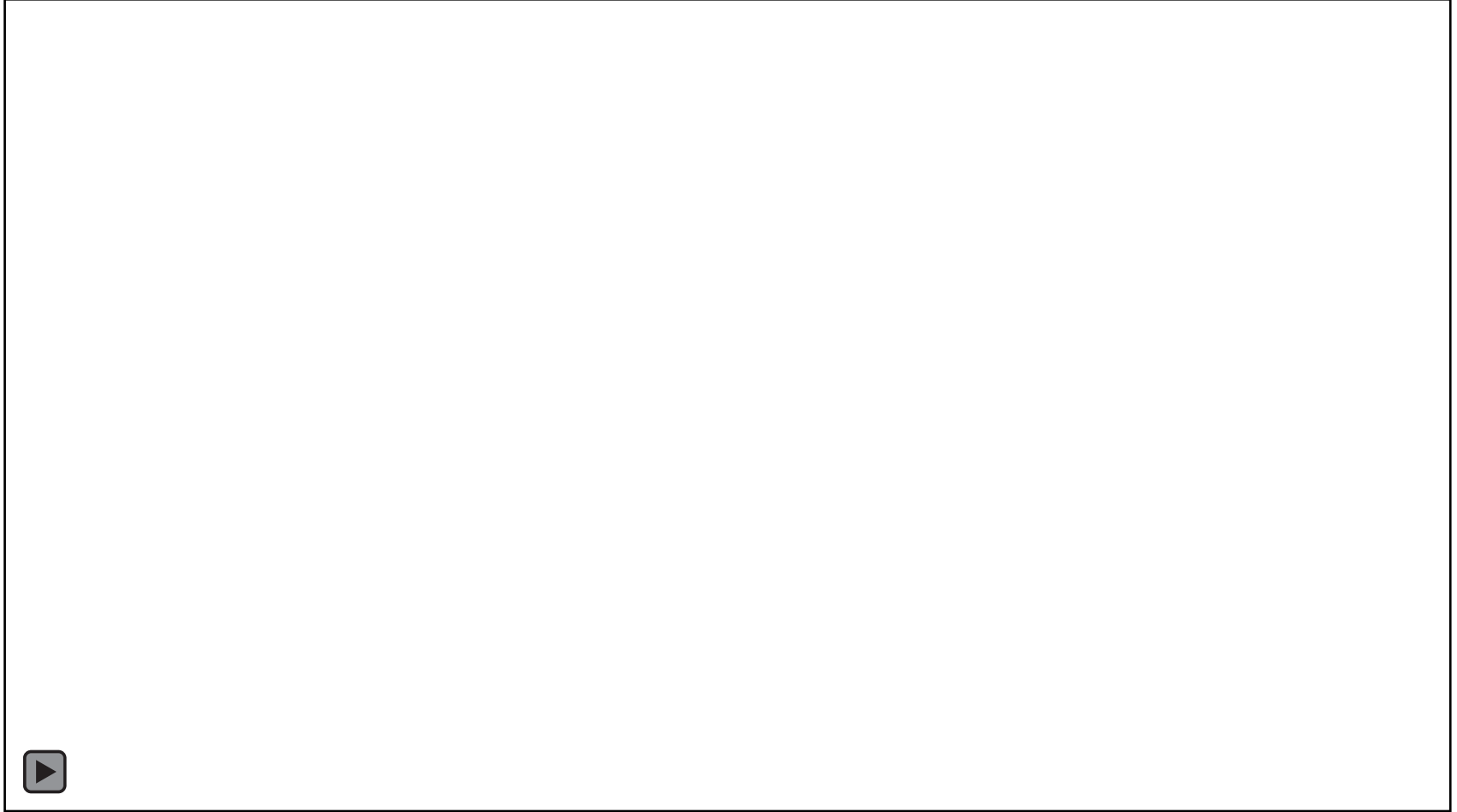


Variable screening based on **SS-ANOVA** >> detects the most important input variables in a process

- ✓ Efficient with **scarce** and **not factorial** database
- ✓ Detect **non-linear** and **interaction** effects



>> Sensitivity Analysis tool





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Process & Optimization

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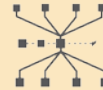
PROCESS and OPTIMIZATION



AUTOMATION DESIGNER

Workflow [CREATE, EDIT, RUN]

Integr. pack M



SINGLE DISCIPLINE DESIGN

Workflow [CREATE, EDIT, RUN]

Analytics tools | Design Space Expl.

Integr. pack M



MULTI DISCIPLINE DESIGN

Workflow [CREATE, EDIT, RUN]

Analytics tools | Design Space Expl.

Robust Design & MCDM | Integr. pack L



OPTIMEAZY

pilOPT workflow [CREATE, EDIT, RUN]

Integr. pack S



>> enhanced flexibility for advanced **optimization** and process **integration & automation**

PROFILES

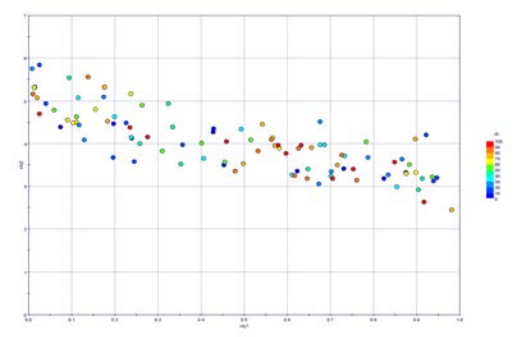
- ✓ respond to different expert needs
- ✓ facilitate effective workload balance within design teams
- ✓ focus on specific sets practices





pilOPT: self-adapting one-click optimizer

pilOPT



The new self-adapting one-click optimization algorithm

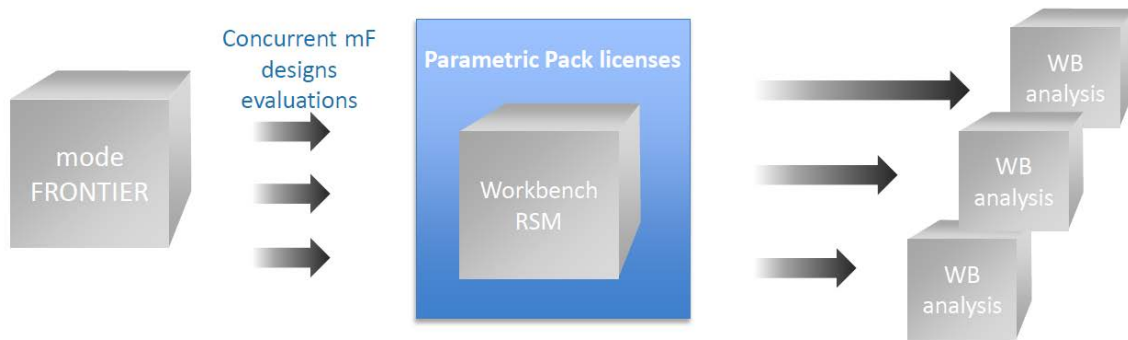
new pilOPT release:

- ✓ responding to a **wider variety** of engineering designs problems
- ✓ increased performance with **single-objective** problems
- ✓ better **exploitation of computational** resources
- ✓ effective handling of problems with **discrete** variables.

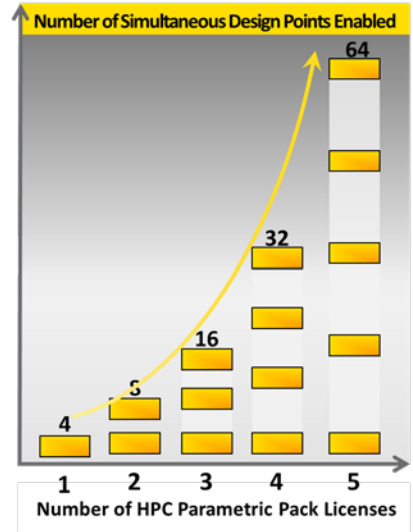
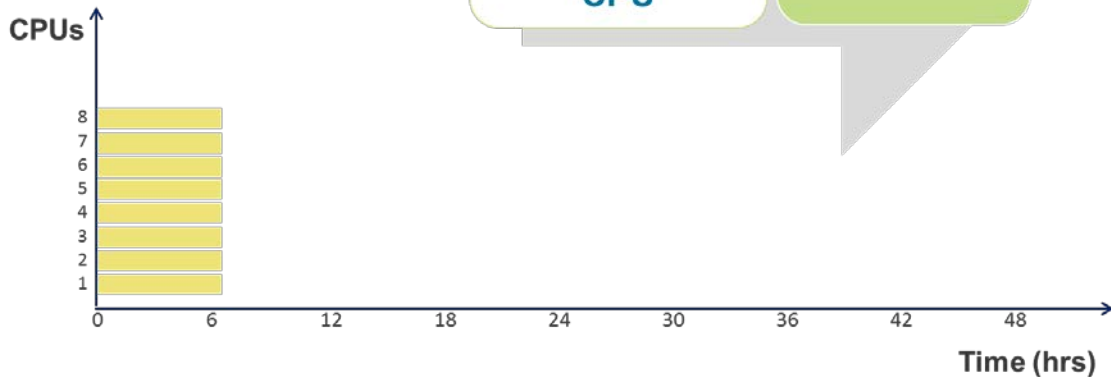
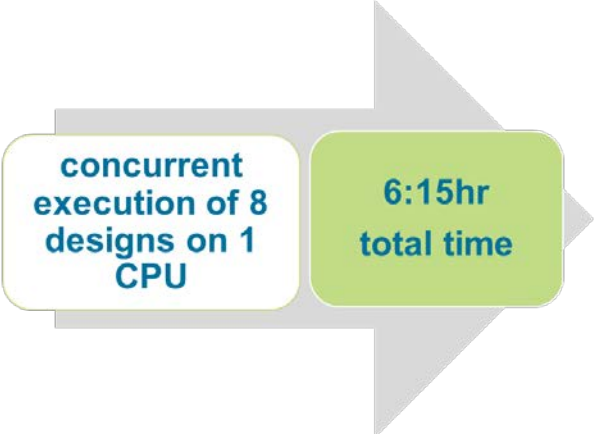


>> Integration node – Ansys WB Parametric Pack

modeFRONTIER 2016 supports the HPC license consumption scheme from Ansys Workbench



modeFRONTIER submitting designs through 2 ANSYS HPC parametric packs



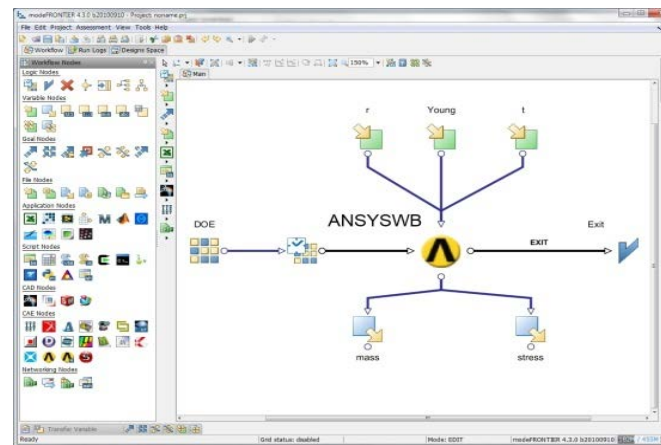
>> Ansys Integration node - advantages

>> fully exploit the **process automation** capabilities of modeFRONTIER in combination with the accuracy of the ANSYS multiphysics solvers

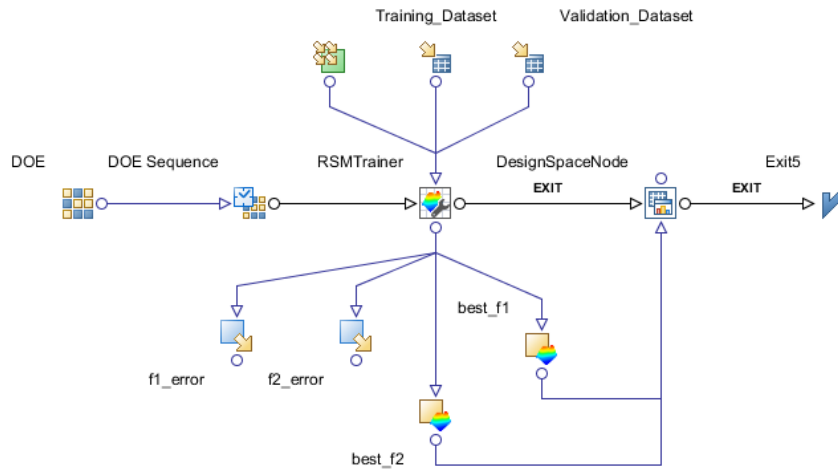
>> get **optimization results before** and dedicate more time to post processing and data analysis

>> **Multiple concurrent design evaluations** without checking out additional Workbench licenses

>> **save on HPC setup costs**

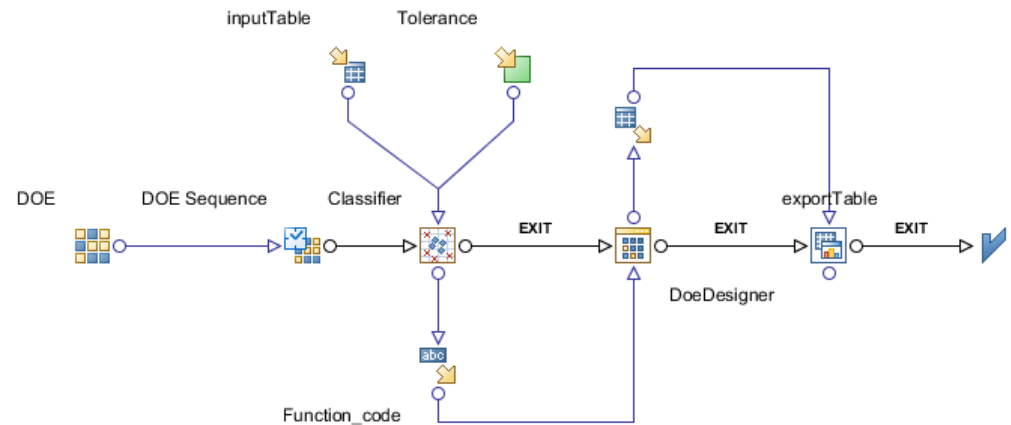


>> New Processing Nodes



RSM Trainer node: response surfaces can be automatically trained/validated

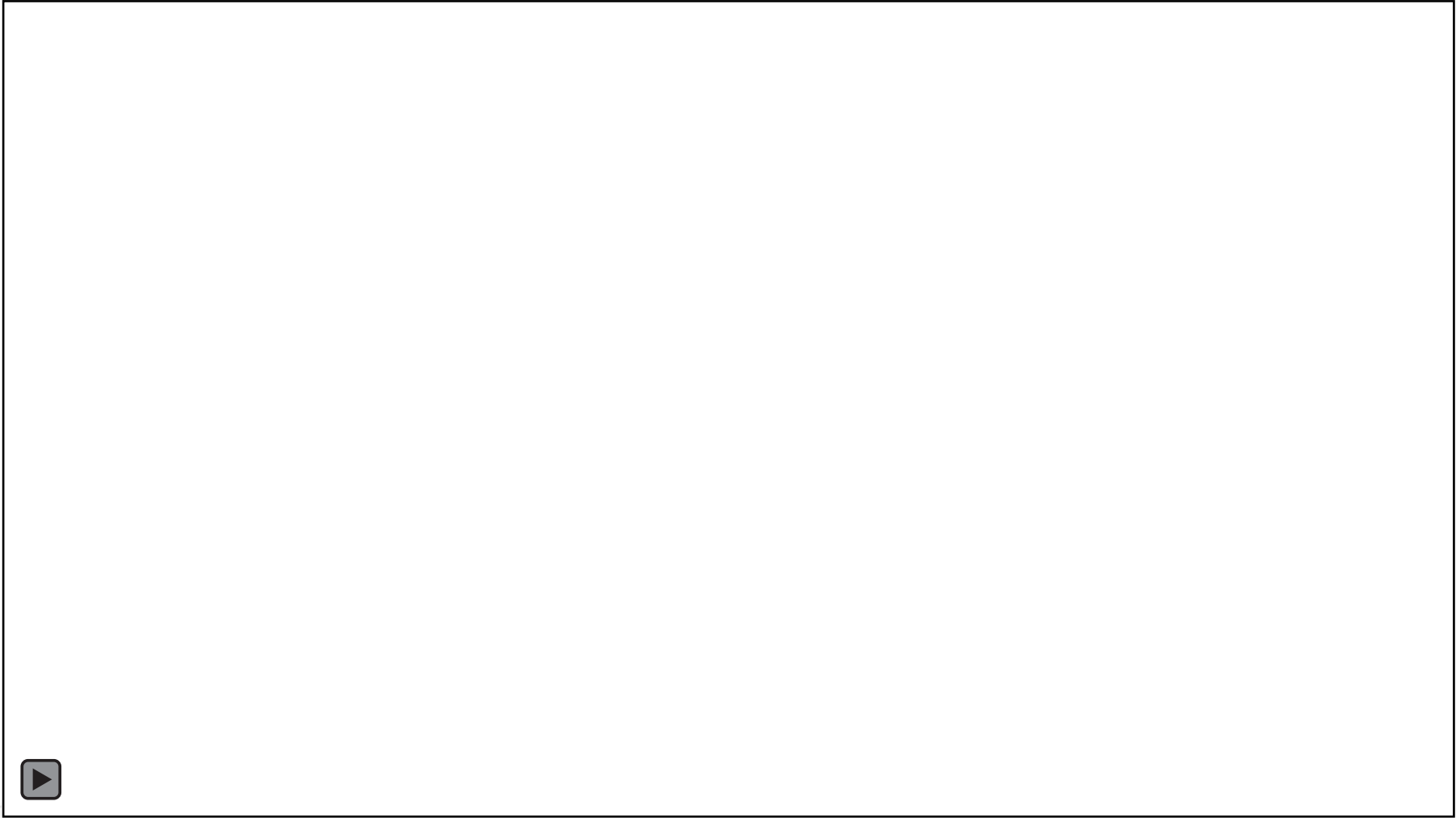
Classifier node: generating an analytic constraint based on given database



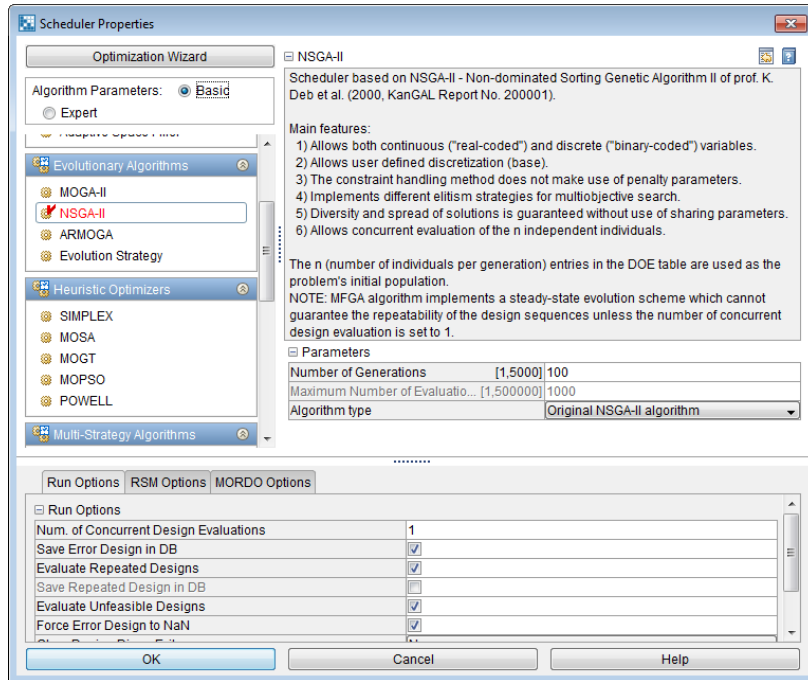
Design Space node: RSM functions and Worktables can be saved in Design Space as soon as created by process flow



>> New Processing Nodes

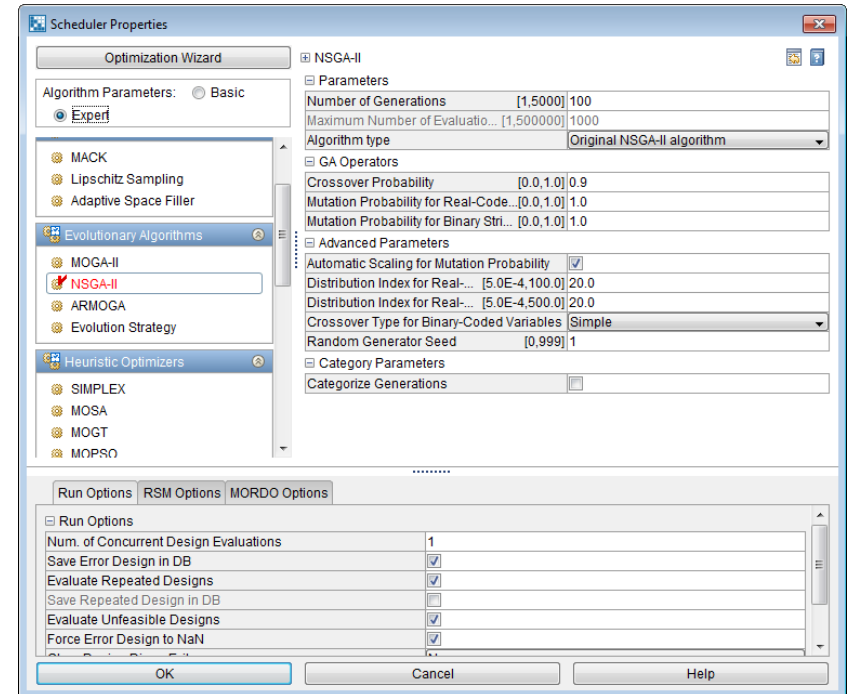


Basic and Expert mode



Basic mode: easy set-up of only essential algorithm parameters

Expert mode: edit advanced algorithm parameters

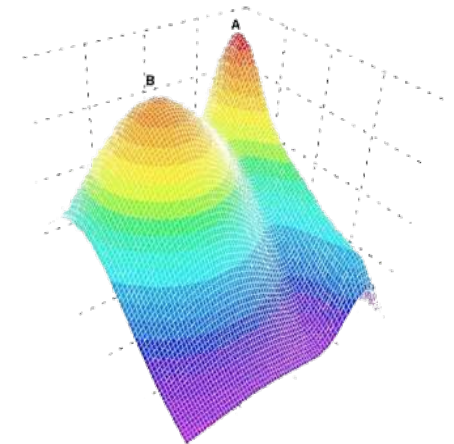
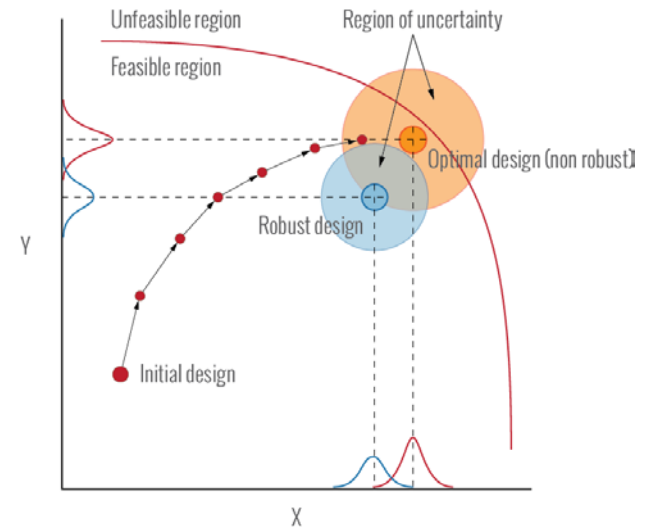


MORDO – Adaptive Sparse PCE

Advantage:

Solving robust design optimization problems with higher number of uncertainties than traditional PCE

Run Options	RSM Options	MORDO Options
MORDO Options		
Sampling Mode	Latin Hypercube Sampling	
Seed	1	
Num. of Design Samples	50	
Num. of Virtual Samples	0	
MORDO Advanced Options		
Polynomial Chaos	Adaptive Sparse	
Order of Chaos Expansion	4	
Reject Out of Bounds Samples	<input type="checkbox"/>	
Error Samples Acceptance Level %	100	
Resample Repeated Robust Designs	<input type="checkbox"/>	



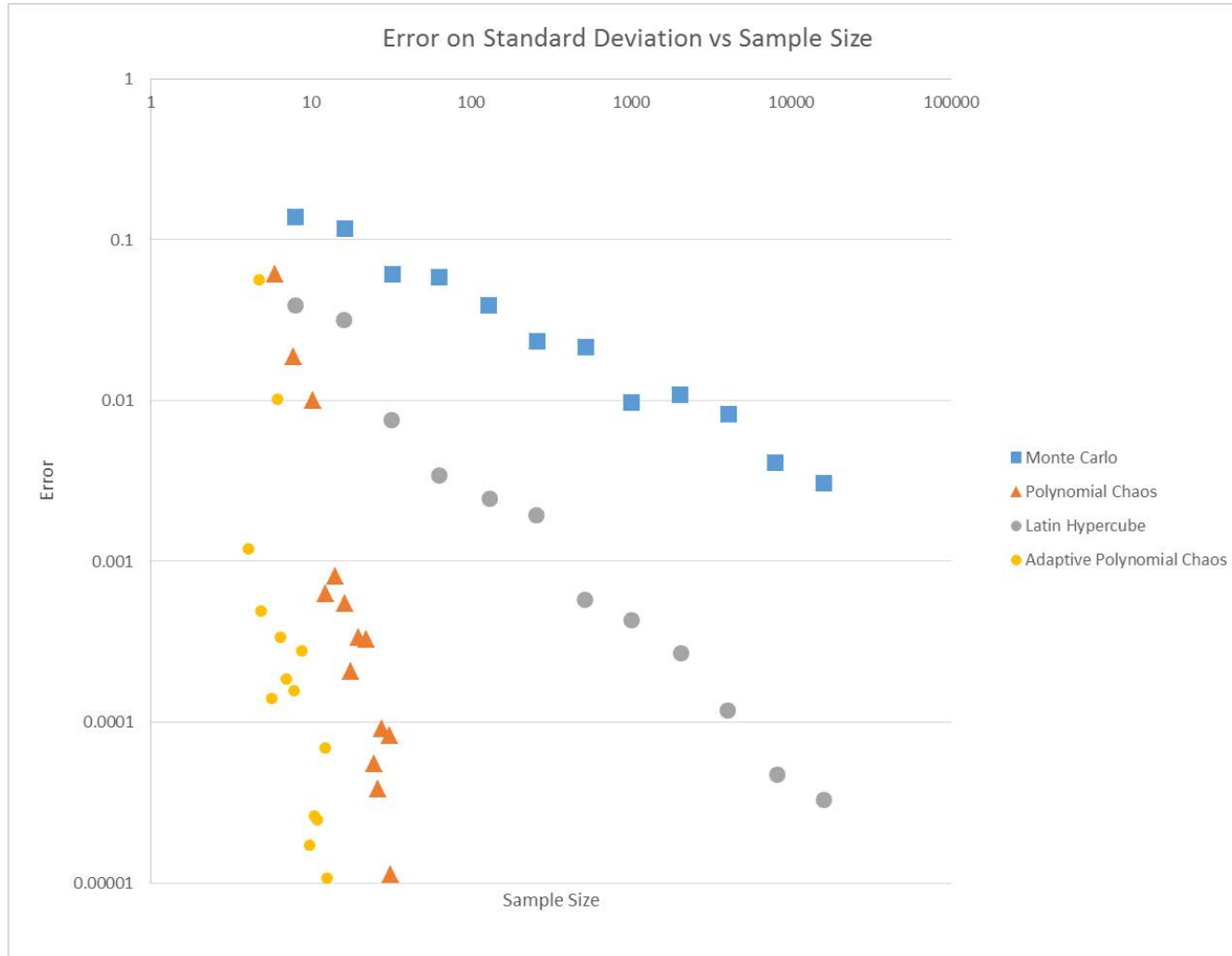
How it works:

Captures polynomial terms impacting most the model

→ less samples and less CPU time



MORDO – Adaptive Sparse PCE



Number of sampling simulations can be reduced drastically!

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WEBINAR
SERIES

SAVE THE DATES > AUTUMN WEBINAR SERIES

SEPTEMBER 15th

modeFRONTIER 2016 &
ANSYS HPC Parametric
Pack

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OCTOBER 5th

Focus on RSM
functionalities in
modeFRONTIER 2016

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OCTOBER 26th

New Solutions for
Complex Workflow
Management

REGISTER NOW!

NOVEMBER 9th

Robust Design
Optimization with
modeFRONTIER 2016

REGISTER NOW!



thanks for the attention!
QUESTIONS > use the webex chat



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