



EXPLORE DESIGN PERFECTION



Part 1) modeFRONTIER Basic Training

COURSE LENGTH: 8 hours

Description

modeFRONTIER is a comprehensive solution for process automation and optimization in the engineering design process. It is a platform and modular environment to manage the logical steps of an engineering design process. Its workflow and the integration with third party tools (such as geometry modelers and simulation software) enable the automation of the simulation process. A suite of design of experiments and optimization algorithms drive the search for optimal solutions. Advanced computational tools for data analysis and visualization support the decision making process and the understanding of the different choices' implication, helping to identify of the right design alternative.

This course is intended to give participants the basic knowledge of the software main features, allowing to build independently process automation workflows and analyze proficiently simulation results.

Program

Module 1: Introduction to modeFRONTIER

Module 2: Workflow and Process Automation

Module 3: Design Of Experiments

Module 4: Design Space Exploration

Module 5: Introduction to Optimization Algorithms

Module 6: Introduction to Response Surfaces

Targets

Understand the application scenarios of modeFRONTIER



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Learn how to build a basic workflow for process automation

Learn the basics of Optimization strategies

Learn how to explore databases

Prerequisites

Basic knowledge of CAE simulation software

Basic knowledge of scripting languages (not mandatory)

Recipients

Engineers and designers needing a tool to improve design of their products

Engineers and designers needing to analyze database

Engineers and designers needing to automatize simulation process execution

Module 1: Introduction to modeFRONTIER

- I. Design Optimization Success Stories
- II. The Concept behind Design Optimization

Module 2: Workflow and Process Automation

- I. Definition of Optimization Parameters
- II. Definition of Process Automation workflow components
- III. Interface for CAE software automation



IV. Hands-on to learn how to build process integration workflows

Module 3: [Design Of Experiments](#)

- I. DOE Definition and Applications
- II. Introduction to DOE Algorithms
- III. Hands-on to learn how to setup a DOE plan

Module 4: [Design Space Exploration](#)

- I. Process Execution Monitoring
- II. Design Space Exploration Tools and Charts
- III. Introduction to Statistics with modeFRONTIER
- IV. Hands-on to learn how to use basic Design Exploration charts of modeFRONTIER

Module 5: [Introduction to Optimization Algorithms](#)

- I. Optimization definition and classification of Algorithms
- II. Introduction to basic Optimization Algorithms
- III. Hands-on to learn how to execute an optimization with modeFRONTIER
- IV. Optimization examples

Module 6: [Introduction to Response Surfaces](#)

- I. Introduction to Response Surfaces with modeFRONTIER
- II. Best Practice for Response Surface applications



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Part 2) modeFRONTIER Advanced Training

COURSE LENGTH: 10 hours

Description

modeFRONTIER is a comprehensive solution for process automation and optimization in the engineering design process. It is a platform and modular environment to manage the logical steps of an engineering design process. Its workflow and the integration with third party tools (such as geometry modelers and simulation software) enable the automation of the simulation process. A suite of design of experiments and optimization algorithms drive the search for optimal solutions. Advanced computational tools for data analysis and visualization support the decision making process and the understanding of the different choices' implication, helping to identify of the right design alternative.

The aim of this course is to give participants an advanced knowledge to most of the software capabilities, allowing to optimize its usage in any phase of design process.

Program

Module 1: Complex Process Automation

Module 2: Advanced Optimization Strategies

Module 3: Advanced Response Surfaces

Module 4: Advanced Statistics and Multi Variate Analysis

Module 5: Robust Design Optimization

Targets

Improve the knowledge of application scenarios for modeFRONTIER

Learn to manage complexity in process automation



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Learn how to setup the best optimization strategy

Learn how to analyze efficiently database and simulation results

Learn how to take into account uncertainties in design process

Prerequisites

Basic knowledge of modeFRONTIER

Basic knowledge of Process Automation

Basic knowledge of Optimization algorithms

Basic knowledge of Design Exploration tools

Recipients

Engineers and designers needing to optimize the design of their products with modeFRONTIER in the most efficient way

Module 1: Complex Process Automation

- I. Complex Workflow management in modeFRONTIER
- II. Introduction to advanced workflow nodes and modules
- III. Application example to MDO case

Module 2: Advanced Optimization Strategies

- I. DOE initialization for optimization process
- II. Evolutionary and Deterministic algorithms
- III. Algorithms combining multiple Strategies
- IV. Basic theory, best practice and benchmarks



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V. Many Objectives problems

VI. Hierarchical Optimization

Module 3: [Advanced Response Surfaces](#)

I. Definitions and classification of Response Surfaces

II. Basic theory and best practice for Response Surface Algorithms

III. RSM Wizard and RSM Exploration charts

IV. Adaptive Space Filler for automatic improvement of RSM quality

V. Hands-on: Application of Response Surfaces

Module 4: [Advanced Statistics and Multi Variate Analysis](#)

I. Statistical Analysis applications with modeFRONTIER

II. How to import design database in modeFRONTIER

III. Visualization and Multi Variate Analysis tools

V. Correlation and Sensitivity Analysis in modeFRONTIER

V.I Hands-on: Application of Statistical tools

Module 5: [Robust Design Optimization](#)

I. Why Robust Design Optimization

II. Application Examples from Industry

III. Uncertainty Quantification and Sampling Methodologies



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- IV. Hands-on: Robustness analysis
- V. Robust Design and Reliability-based Optimization
- VI. Hands-on: Robust Optimization application
- VII. Reverse Robust Design Optimization or Tolerance Design