ESI | Part of Keysight

KEYSIGHT

ESI Group
Training Catalog 2025

Innovators
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A Message from Sebastien

I'm glad you are here. Thank you and welcome.

For the past 50 years, the world's largest engineering and manufacturing organizations have trusted ESI to transform the way they work. Whether you are using our product performance, smart manufacturing, or human-centric solutions we strive to support you, our customers, at every step along your journey toward a digital and more agile future.

'Knowledge is power'.

At ESI, we believe that the more knowledge you have about using our products, the more powerful they will be to you, and you can truly achieve your expected business results. So, once you are up and running, we are here to guide you to learn, practice and assess your skills along the way at your own pace. With this broad and comprehensive Training Catalog, we bring to you the training courses and additional support, to empower you to get the best out of your ESI solution, whether you are a new customer or an existing one

Decades of training and technical expertise are ready for you in tailored learning paths.

With close to 50 years of expertise in software application training, highly skilled engineers teach our training courses responsible for consulting and support activities and with years of practice and field experience. We appreciate that people learn differently so we offer both online and on-premise courses, with a mixture of theory and practical-based exercises to guarantee software adoption.

Learning is a continuous journey.

Our standard trainings are just the initial step of your learning journey. Over time, the knowledge you gain will help you boost your career and unleash your true potential to innovate at an even faster pace. To demonstrate our strong commitment to guide you, our experts' team also offers dedicated training components to ensure you are up to date with the latest technology evolutions: Software releases, focused application webinars, ESI Live events, ESI Blog, etc. Check out this Catalog to learn more and look out for our newsletters!

So let us help you innovate, without compromise.

> " *At ESI Group (Part of Keysight Technologies), we design our training with our customers in mind, to help accelerate software adoption and their success.* "

Dr. Sebastien Vilfayeau
Global Head of Adoption
Keysight Technologies (DES Organization)

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ESI. Innovation Without Compromise.

Over the last five decades, we have been pushing the limits of what's possible.

- We are pioneers of a virtual-first approach to solve the most complex and critical problems with simulation.

- Our legacy of innovation dates to our first predictive simulated automotive crash test in 1985.

- We continue to lead the way with product assembly reviews in the industrial metaverse.

We believe that the diversity of people, perspectives, and experiences is our superpower.
When our international teams come together, we unleash our creative potential to protect what matters most - our people and our planet.

A passion for protecting our future.
We believe in sustainable product innovation, efficient manufacturing processes, and simulation-proven physical testing, to help create products that are clean throughout their lifetime with a smaller environmental footprint.

Unlocking true potential with human creativity
Our technology and expertise are focused on helping companies work smarter, reducing costs, improving quality and productivity, accelerating time to market, and improving product lifetime and industrial performance.

Trusted to create a safer world
We are trusted to create a safer world, and our work is critical to some of the biggest brands on the planet to ensure drivers, passengers, pedestrians, and workers' daily lives are ever safer.
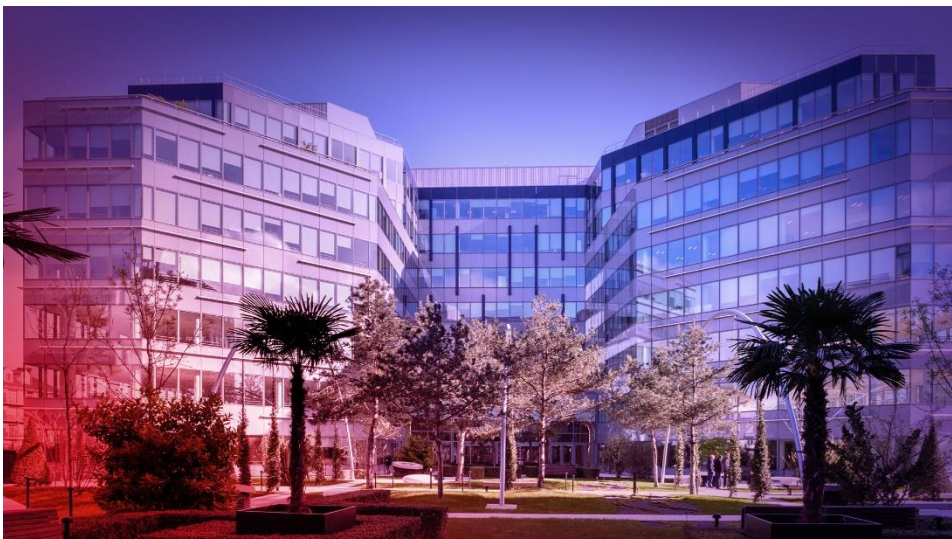
Keysight Technologies SAS
France Headquarters
Bagneux, France.

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Accelerated Hybrid Learning Approach for Maximum, Scalable Results

At ESI Group, we understand that **every team is unique,** and so are their learning preferences and challenges.

This is why we offer a **Blended Learning Approach –** a flexible combination of eLearning & instructor-led training, designed to meet your specific needs.

Our approach ensures:

- **Faster Onboarding:** Equip your teams with the skills they need to hit the ground running.
- **Accelerated Time to Value:** Enable quicker adoption and effective application of our solutions, maximizing your return on investment.
- **Customized Learning Paths:** Tailored programs that adapt to your team's schedule, learning styles, and project timelines.
- **Scalable:** Seamlessly grow and train teams of any size, across locations, without compromising quality or consistency.

Standard Customer Training - With an experienced instructor, online or in-person, dedicated to your organization. This catalog contains our comprehensive collection of courses available.

Standard Classroom Training – Open to numerous companies, held virtually with one of our instructors. View the schedule for 2025

Custom Training – Training that is fully customizable and suited to your specific use cases

eLearning - Self-paced eLearning, available 24/7, giving you access to our expertise at a global, scalable, and more affordable setting

Whether your goal is to **train new hires, upskill your workforce, or prepare for a critical project launch**, our blended learning solutions deliver results that matter.
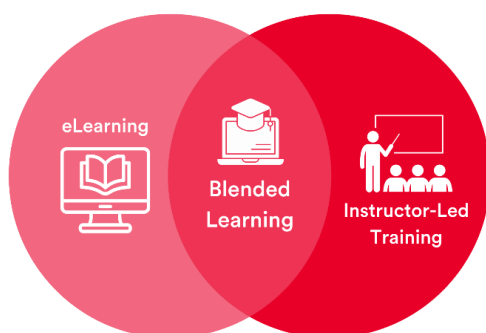
Learn more about our

eLearning courses & platform here:

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Training Designed for Your Needs

Skilled Trainers = Skilled Customers

Our trainers are not just Subject Matter Experts – They are trained Facilitators, too.

Through internal training sessions and Train-The-Trainer events, our commitment to excellence is demonstrated. Our trainers have opportunities to refine their instruction techniques, stay updated on adult training principles, and consistently deliver top-tier training experiences to our customers.

Customer Satisfaction at the Core

With more than 900+ customers trained in 2024, we consistently achieve high customer satisfaction across the board.

Our customers are enabled and ready to use our software, whatever the training delivery format may be, we're able to maintain a high rate of satisfaction through our various training initiatives.

Whether is helping you get started on a new software, or teaching you to maximize your workflows in a product you're already familiar with, we're focused on your success.

Book your seat at your next training with ESI today!

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Our Services & Training

Training forms part of our services offered at ESI, included in the Onboarding and Adoption services packages.

Whether in the context of onboarding, adoption technologies or other expected outcomes, Process have been packaged to provide a structured and efficient way to meet the diverse needs of clients while offering them flexibility and cost-effectiveness.

Some services we offer include:

Onboarding Services: Dedicated to helping you effectively start to use ESI tools

Adoption Services: Aimed at improving efficiency, productivity, or other specific objectives related to the use of technology.

Acceleration Services: Support you in your process of broadening functional scope, extending usage to new use cases, or large-scale adoption.

Transformation Services: This refers to the full range of our consulting activities to help your organization adopt, implement, and optimize our solutions as part of its process to modernize operations, improve efficiency, and fully exploit the benefits of our digital technologies.
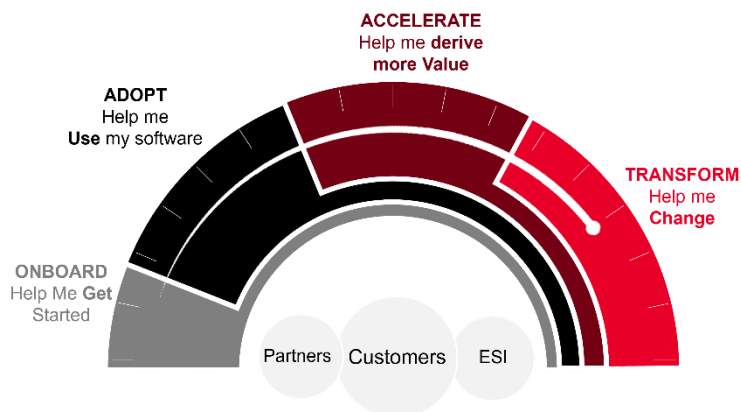
Learn more about our service packages here:

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Product Performance

Virtual Performance Solution (VPS)
VPS Explicit

VPS-Explicit Learning Path
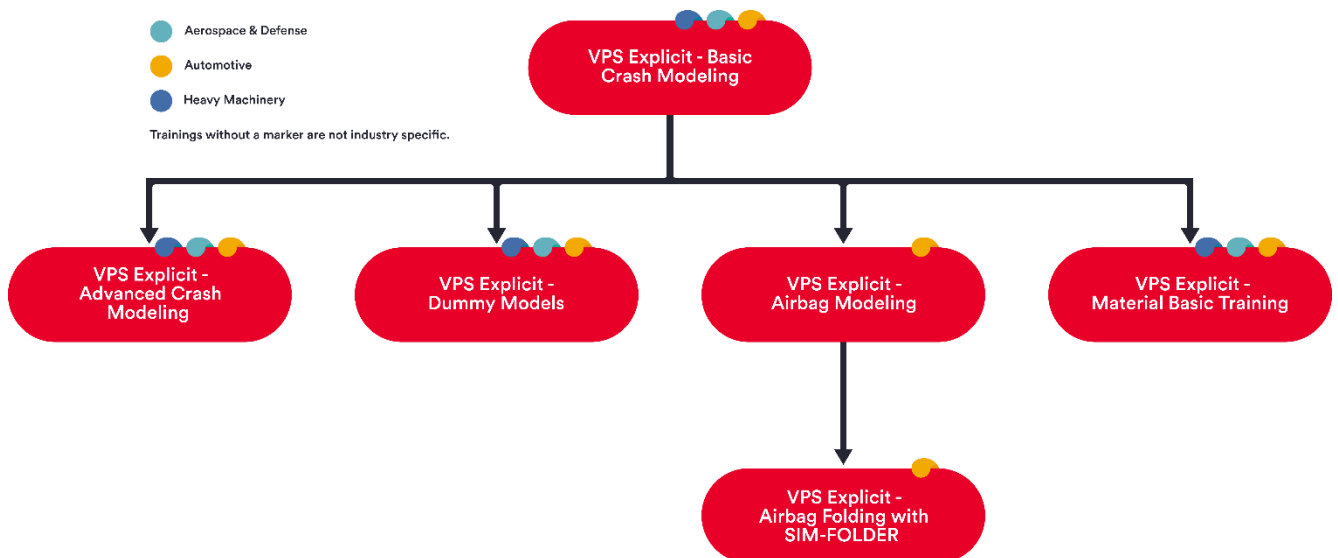
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VPS Explicit - Basic Crash Modeling

Learn about and understand the basic aspects of crash simulations.
Discover how to set up a simple component crash model step by step with all essential options, evaluate the results, and confirm their plausibility.

BASIC

3 DAYS

Audience

Engineers that use VPS/PAM-CRASH to solve dynamic structural problems.

Prerequisites

Basic knowledge of the Finite Element Method is beneficial.

Description

For efficient and successful working with VPS/PAM-CRASH, a solid understanding of the basic algorithms of an explicit code, as well as of the essential program options, are necessary.
Therefore, after a short overview of the general capabilities of VPS/PAM-CRASH, the course will introduce how to solve structural problems with explicit time integration.
Subsequently, all options will be explained, which are required to perform a standard crash simulation.

The course is accompanied by exercises.

Training Program

Day 1

- ✓ Overview & Preparation of VPS
  - o Application of VPS
  - o Documentation
- ✓ Overview of explicit FEM
- ✓ Pre-/post-processing, input/output structure
  - o File Organization
- ✓ Boundary conditions, external loads
- ✓ Finite Element Library (Hands-On)

Day 2

- ✓ Material models
- ✓ Kinematic options
- ✓ Contact modeling
- ✓ Rigid bodies, spotweld modeling
  - o Hands-On

Day 3

- ✓ Modeling elastic-plastic problems
- ✓ Time step control
- ✓ Restart, Energy balance, stability

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VPS Explicit - Advanced Crash Modeling

Extend your know-how with advanced VPS options. Learn how to derive component simulations from full car simulations and combine different levels of detail. Learn to transfer simulation-/manufacturing results to a subsequent simulation. Learn to combine different load cases and disciplines in one simulation. Learn to analyze and improve the performance and robustness of the simulation.

Audience

Engineers that already have gathered experience in crash simulations.

Prerequisites

Completion of VPS Explicit - Basic Crash Modeling Training.

Description

The course is aimed at users of VPS/PAM-CRASH who have already gained initial experience in performing crash simulations. Options will be worked through that allow users to represent the physics of the considered problems in even more detail. The theoretical part is accompanied by a practical exercise.
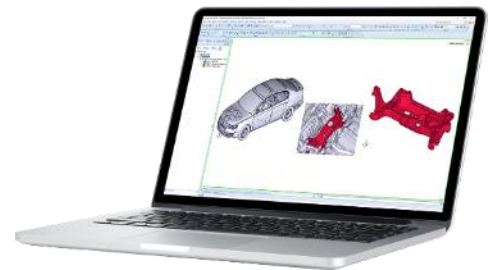
Training Program

Day 1

- ✓ Substructure option
- ✓ Multi-Model-Coupling
- ✓ Shell-Solid-Remeshing
- ✓ Chaining of simulations
    - ○ Picking
    - ○ Initial Metric
    - ○ Import/Export
    - ○ Inverse solver
    - ○ Multistage option
- ✓ Performance tuning
- ✓ Overview of Modular Input

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VPS Explicit - Dummy Models

Learn about and understand the variety of dummy models and how to utilize them. Learn to position and integrate a dummy model into a vehicle. Learn to set up a belt system with elaborated retractor options, such as a pyrotechnical pre-tensioner and load limiter. Learn to analyze the dynamic results, including the sensor output of a dummy model.

Audience

Users of VPS Explicit - PAM-CRASH/-SAFE who need to use dummy models in their daily work.

Prerequisites

Completion of VPS Explicit - Basic Crash Modeling Training.

Description

In passive safety vehicle simulations, the usage of dummy models has become standard for a long time. The increasing requirements in many different load cases require a realistic behavior of the numerical models. In this course, the participants learn fundamental as well as more advanced ways of handling dummy models. The required VPS/PAM-SAFE options are introduced by theoretical and practical applications. For pre-and post-processing, Visual-Crash-Pam (VCP), as well as Visual-Viewer, will be used. Special focuses in the course for selected topics may be defined on request.

Training Program

Day 1

- ✓ Overview of available Dummy models
- ✓ Insertion procedures
    - o Dummy positioning
    - o Seat Morphing
    - o Simulation possibilities
- ✓ Belt modeling
    - o Meshing and belt fitting
    - o Slipring, retractor modeling
    - o Material models for belts
- ✓ Evaluation
    - o Basics of injury criteria
    - o Dummy evaluation
- ✓ Practical example: Side crash
    - o Dummy integration into the vehicle
    - o Evaluation

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VPS Explicit - Airbag Modeling

Learn about and understand the basic aspects of airbag modeling. **Learn to set up a simple Uniform Pressure airbag, how to add the definitions for gas dynamics (FPM) and analyze the results. Learn how to ensure your model accuracy by learning about the best modeling guidelines and practices.**

ADVANCED   2 DAYS

Audience

Engineers who have already gathered experience in crash and airbag design.

Prerequisites

Completion of VPS Explicit - Basic Crash Modeling Training**.**

Description

For simulation in vehicle safety, the use of airbag models has been standard for a long time. In most cases, models defined with the uniform-pressure option are sufficient. The growing requirements for out-of-position load cases, the deployment of side airbags, and the investigation of the opening behavior of cover flaps make it essential to enable a numerical description of the gas dynamics inside the airbag. This is where the Finite Point Method (FPM), a CFD method developed by ESI, comes into play. Participants will learn the basics as well as possible procedures for modeling airbag systems. Theory and practical applications introduce the function and use of the individual VPS/PAM-SAFE options. The course covers the construction of simple, basic airbag models up to the extension of the models to be able to represent the flow behavior of the airbag gas in detail. Visual-CRASH for PAM and Visual-Viewer are used for pre-and post-processing.

Training Program

Day 1

- ✓ Basics of airbag definition
- ✓ Meshing and Folding
- ✓ Single- and Multi-chamber option
- ✓ Possibilities of Initial Metric Option
- ✓ Material models for airbag fabrics
- ✓ Contact definition for airbags
- ✓ Exercises in between
- ✓ Explanations about Pre- and Post-processing

Day 2

- ✓ Overview of the theory of FPM
- ✓ Explanations with different application examples
- ✓ Setup and transformation of example datasets
- ✓ Exercises in between
- ✓ Explanations about Pre- and Post-processing
- ✓ Usage of customer datasets (on demand)

VPS Explicit - Airbag folding w/ SIM-FOLDER

Learn about and understand the possibilities of airbag folding simulation. Learn to set up and perform a folding simulation step by step with a simplified airbag. Use the variety of folding tools of the SIM-FOLDER database and learn how to create new folding tools easily. Learn to parameterize the folding steps and use them in a chained process.

Audience

Engineers who have already gathered experience in crash- and airbag simulation.

Prerequisites

Completion of VPS Explicit - Basic Crash Modeling Training and VPS Explicit - Airbag Modeling Training**.**

Description

For simulation in vehicle safety, the use of airbag models has been standard for a long time. In most cases, models defined with the uniform-pressure option are sufficient. The growing requirements for out-of-position load cases, the deployment of side airbags, and the investigation of the opening behavior of cover flaps make it essential to enable a numerical description of the gas dynamics inside the airbag. This is where the Finite Point Method (FPM), a CFD method developed by ESI, comes into play. Participants will learn the basics as well as possible procedures for modeling airbag systems. Theory and practical applications introduce the function and use of the individual VPS/PAM-SAFE options. The course covers the construction of simple, basic airbag models up to the extension of the models to be able to represent the flow behavior of the airbag gas in detail. Visual-CRASH for PAM and Visual-Viewer are used for pre-and post-processing.

Training Program

Day 1 - Sim Folder GUI

- ✓ Work with different tools
- ✓ Changing unit system
- ✓ Tool Maker
- ✓ Chaining
- ✓ Exercises in between

Day 2 - Sim Folder Macros

- ✓ Switch to Sim-Folder Macros
- ✓ XML Sequence File
- ✓ Additional tools
- ✓ Groups
- ✓ Exercises in between

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VPS Explicit - Material Modeling

Understand the phenomena of individual material classes and learn which standard material models exist in VPS to describe this material behavior.

ADVANCED

2 DAYS

Audience

VPS or CAE engineers.

Prerequisites

Completion of VPS Explicit - Basic Crash Modeling Training

Description

The aim of the course is to impart practical knowledge for the application of the material models available in VPS/PAM-CRASH. The necessary theoretical basics are briefly presented at the beginning of the respective special topic. Typical phenomena of individual material classes and the possibility of describing these phenomena with VPS/PAM-CRASH will be discussed. The participants are informed which model is optimal for the respective material and load case.
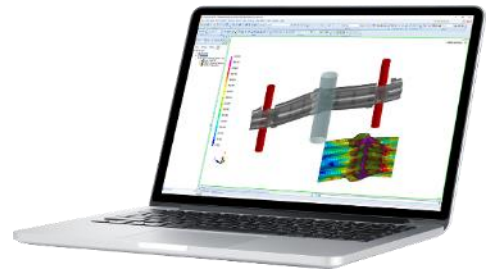
Training Program

Day 1 - Basic Material Modelling

- ✓ Introduction
- ✓ Metals + exercise
- ✓ Plastics
- ✓ Foams
- ✓ Rubber
- ✓ Fabric
- ✓ Adhesive

Day 2 - Damage & Failure

- ✓ Introduction
- ✓ General theory + exercise
- ✓ Standard models
- ✓ Advanced models

VPS Implicit

VPS-Implicit Learning Path

🟢 Aerospace & Defense

🟡 Automotive

🔵 Heavy Machinery

Trainings without a marker are not industry specific.

VPS Implicit - Basic Training 🟡

VPS Implicit - Linear and non-linear statics 🟡

VPS Implicit - Dynamics (Modal Analysis and NVH) 🟡

VPS Implicit - Boundary Element Method 🟡

VPS Implicit - NVH - Automotive Low Frequency Interior Acoustics 🟡

VPS Implicit - Transmission Loss 🟡
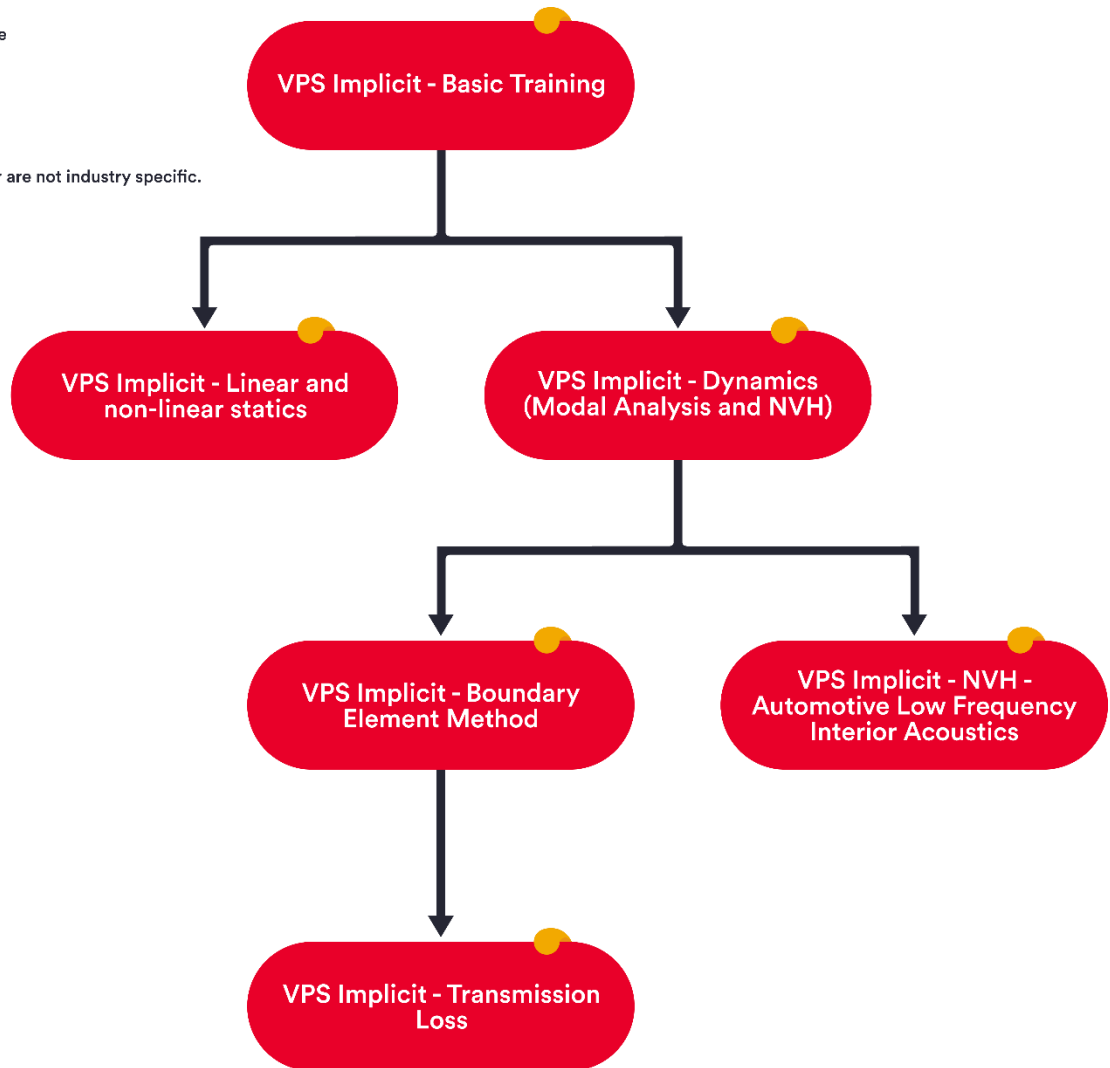
VPS Implicit - Basic Training

Learn about and understand the general of a VPS model. Learn to set up and run a simple static linear or nonlinear static load case with VPS and evaluate the results.

Audience

CAE engineers.

Prerequisites

Basic knowledge of Finite Element Method

Description

This course is intended for participants without experience in VPS. The aim is to convey a comprehensive understanding of the model building blocks, the model set-up, and the data structure of implicit VPS models. The content is deepened with the help of exercises, where the participants learn how to set up and solve a model, evaluate the results, and how to easily switch between explicit and implicit analysis types.

Training Program

Day 1

- ✓ Introduction to VPS
- ✓ Basics of VPS
- ✓ Pre-/post-processing, input/output structure
- ✓ Boundary conditions and loads
- ✓ Exercise 1
- ✓ Element types
- ✓ Basic material models
- ✓ Connections
- ✓ Exercise 2

VPS Implicit - Linear and Non-Linear Statics

Learn how to create load cases for all static analysis types (statics, thermal, buckling). **Learn how to chain different analysis types in one model.**

ADVANCED

1 DAY

Audience

CAE engineers.

Prerequisites

Completion of VPS Implicit - Basic Training

Description

The aim of this course is to teach the participants how to set up linear and nonlinear static models with VPS Implicit. The topics include specific element types and contacts in VPS Implicit, thermal analyses, and the automatic chaining of explicit and implicit analyses. Hands-on example models complement the topics.
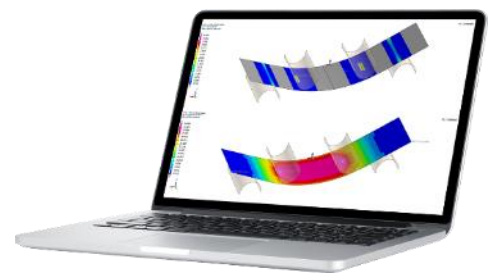
Training Program

Day 1

- ✓ Linear and nonlinear static simulation
- ✓ Contacts
- ✓ Exercise: Contacts
- ✓ Thermal analysis
- ✓ Exercise: Thermal Analysis
- ✓ Buckling
- ✓ Exercise: Buckling
- ✓ Multi-Stage Analyses
- ✓ Exercise: Multi-Stage Analysis
- ✓ Explicit-Implicit Advisor

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VPS Implicit - Dynamics (Modal Analysis and NVH)

Learn how to set up a modal and frequency response model. **Learn about typical NVH results and how to obtain and evaluate them.**

ADVANCED

2 DAYS

Audience

CAE engineers with a focus on NVH and comfort.

Prerequisites

Completion of VPS Implicit - Basic Training.

Description

In this course, the participants will be introduced to linear structural dynamics and working with the NVH application integrated with VPS. Harmonic analyses and their structure will be discussed. Furthermore, the result analysis for NHV simulations is a focus of this course.
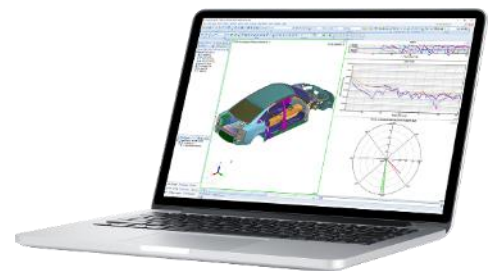
Training Program

Day 1 - Basics

- ✓ Eigenvalue analysis (IRAM/PSM/AMLS)
- ✓ Modal analysis
- ✓ Direct analysis
- ✓ Harmonic loads
- ✓ Damping
- ✓ Result analyses: Mode shapes, modal participation, operational shapes
- ✓ Exercise: Simply supported beam

Day 2 - NVH Analysis

- ✓ Result analyses: Transfer functions, dynamic stiffness
- ✓ Exercise: Harmonic response of car body in white

VPS Implicit - NVH Automotive Low-Frequency Interior Acoustics

Learn how to set up a coupled frequency response analysis for structure.

ADVANCED

1 DAY

Audience

CAE engineers with a focus on NVH and comfort.

Prerequisites

Completion of VPS Implicit - Dynamics (Modal Analysis and NVH) training.

Description

The aim of this course is to show the participants solutions in the field of structural and acoustic simulation. A special focus is the consideration of interior acoustics considering the interaction of fluid structure and the consideration of porous elastic materials.

Training Program

Day 1 - Basics

- ✓ Structural modes
- ✓ Exercise: Structural modal analysis
- ✓ Acoustic modes (including Cavity Meshing)
- ✓ Exercise: Acoustic modal analysis
- ✓ Exercise: Coupled analysis structure-fluid
- ✓ Modelling of elastic porous media
- ✓ Interaction Fluid - Structure - Porous elastic media
- ✓ Exercise: Coupled analysis structure-fluid-trim
- ✓ Results evaluation with Visual-Viewer
- ✓ Solution strategies

VPS Implicit - Boundary Element Method

Learn how to set up a vibroacoustic BEM model for a given structural mesh. Learn how to evaluate results on the BEM surface and the exterior.

Audience

CAE engineers with a focus on NVH.

Prerequisites

Completion of VPS Implicit - Dynamics (Modal Analysis and NVH) training.

Description

The aim of this course is to show the participants solutions of tasks with this method. The interacting methods are uncoupled and strongly coupled. A special focus is the consideration of the sound radiation to the environment.
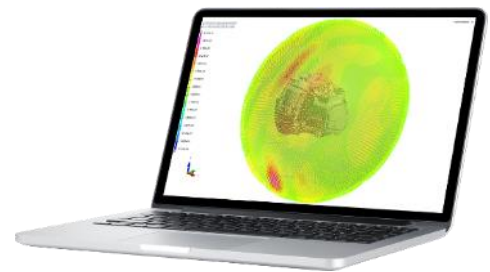
Training Program

Day 1 - BEM

- ✓ Typical application areas
- ✓ Model set-up
- ✓ Exercise 1: Uncoupled BEM
- ✓ Exercise 2: Coupled BEM
- ✓ Exercise 3: Using symmetry
- ✓ Exercise 4: Trimmed body
- ✓ Exercise 5: Gearbox uncoupled (using BEM Wizard)
- ✓ Exercise 6: Gearbox coupled

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VPS Implicit - Transmission Loss

Learn how to set up a transmission loss model for a given structural and trim mesh. Learn how to evaluate transmission loss results.

ADVANCED

1 DAY

Audience

CAE acoustic engineers.

Prerequisites

Completion of VPS Implicit - Boundary Element Method Training.

Description

Transmission loss is the ability of a panel to stop incoming acoustic power from being transmitted through the tested panel. This course is aimed at the simulation of acoustic transmission loss tests with VPS.

Training Program

Day 1 - Transmission Loss

- ✓ Theoretical Background
- ✓ Typical Applications
- ✓ Guidelines and meshing rules
- ✓ Solution process and model layout
- ✓ Sources and outputs
- ✓ Exercise 1: Trimmed Curved Panel
- ✓ Exercise 2: Trimmed Flat Panel

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Visual Environment For VPS

Visual Environment for VPS Learning Path
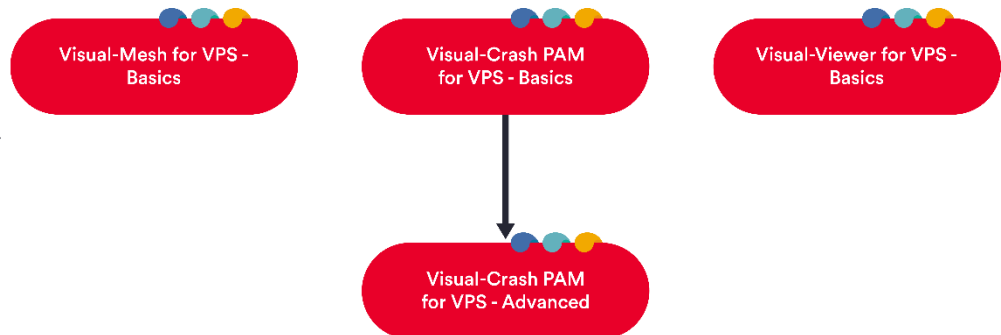
Visual-Mesh for VPS - Basics

Learn how to use Visual-Mesh for VPS. Discover how to import, clean-up and mesh different geometries that can be used for crash, safety, statics, dynamics or NVH applications.

Audience

Engineers that use VPS/PAM-CRASH to solve static or dynamic structural problems.

Prerequisites

No prerequisites.

Description

Visual-Mesh is a powerful program to discretize complex geometries in the field of crash, NVH or other finite element applications. It supports simultaneous work with multiple geometries and FE models in an intuitive and user-friendly interface. Various CAD formats can be imported, cleaned up and then meshed. The training provides a quick and effective introduction to Visual Mesh. Targeted exercises are used to illustrate the basic and the most important functions. The training content is based on general and typical tasks such as

import of CAD geometry data, geometry preparation, meshing and checking the element quality.
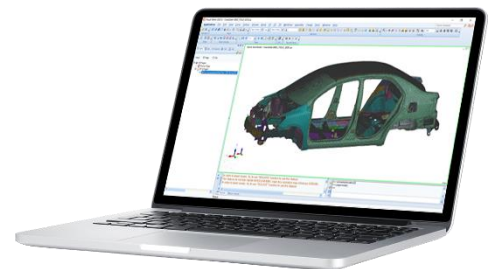
Training Program

Day 1

- ✓ Overview of the user interface
- ✓ Geometry
    - o CAD file import
    - o Data cleaning and geometry preparation
    - o Creation of geometries

Meshing

- o 2D mesh tools
    - § Interactive meshing
    - § Mesh correction options
    - § Auto-mesh options
    - § Topology meshing
- o 3D mesh tools
    - § Layer Mesh
    - § Map Mesh
    - § Tetra-Mesh
    - § Mesh corrections
- o Mesh quality check

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Visual-Crash PAM for VPS - Basics

Learn how to use Visual-Crash PAM to create a VPS model.
Discover how to build a VPS model from scratch or modify an existing model. All the tools you will see are optimized for the solver functionalities, to improve productivity.

BASIC **1 DAY**

Audience

Engineers that use VPS/PAM-CRASH to solve static or dynamic structural problems

Prerequisites

No prerequisites. However, basic knowledge of VPS is useful.

Description

Visual-Crash PAM is a pre-processor specially developed for VPS/PAM-CRASH to build a solver deck quickly, easily, and effectively. This course offers participants a simple and effective introduction to Visual-Crash PAM. Using a variety of exercises, the basic philosophy and the most important functions for model creation are presented, discussed, and applied. The participants learn how to create and modify a VPS model.
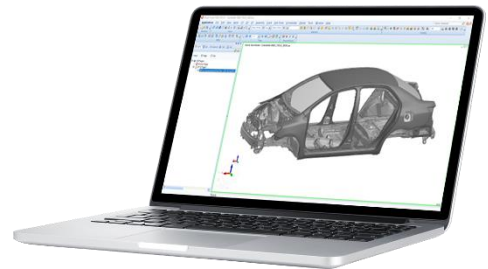
Training Program

Day 1

- ✓ Overview of the user interface
- ✓ Selection options
- ✓ Basic functions and operations
- ✓ Model organization (working with subsystems and include files)
- ✓ Solver Data check
- ✓ Solver Version Manager
- ✓ Creation of a VPS input:
    - o Element & material properties
    - o Loads & boundary conditions
    - o Contacts
- ✓ Model checks
    - o Kinematic check
    - o Penetration check
    - o Mass inertia check
    - o Time-step check
    - o Input checker

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Visual-Crash PAM for VPS - Advanced

Extend your know-how with advanced options in Visual-Crash PAM.
Lear how to use more advanced options and how to be more efficient in the creation and verification of your VPS model.

Audience

Engineers that use VPS/PAM-CRASH to solve static or dynamic structural problems.

Prerequisites

Completion of Visual-Crash PAM for VPS - Basics training.

Description

This extension course is aimed at users who want to improve their skills and their knowledge of working with Visual-Crash PAM. The topics covered are from spotweld generation to the model comparison in Visual-Crash PAM. In addition, several practical exercises are proposed.
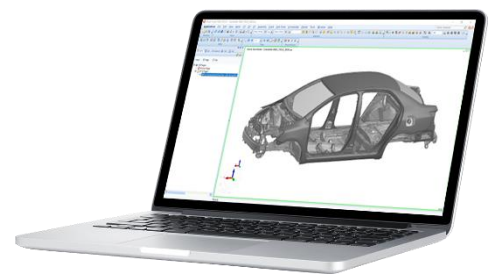
Training Program

Day 1

- ✓ Material & Part Managers
- ✓ Exchange components with Part replace
- ✓ Compare model variants with Model Compare
- ✓ Connection manager
- ✓ Spotweld creation, plink manager and tied projection
- ✓ Conversion tools (units, other codes…)
- ✓ Introduction to dummy positioning

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Visual-Viewer for VPS - Basics

Learn how to use Visual-Viewer for VPS. Discover how to visualize animations, analyze results, plot curves, and make the most effective use of Visual-Viewer's functionalities in your day-to-day work.

Audience

Engineers that use VPS/PAM-CRASH to solve static or dynamic structural problems.

Prerequisites

No prerequisites.

Description

Visual-Viewer is a solver-independent post-processor for displaying animations and curve progressions from finite element simulations. In this course the participants learn the handling and necessary
methods for the evaluation of crash simulations.
The different useful options will be covered in detail.
Curve operations, contour plots and result comparisons explained step by step during practical exercises.
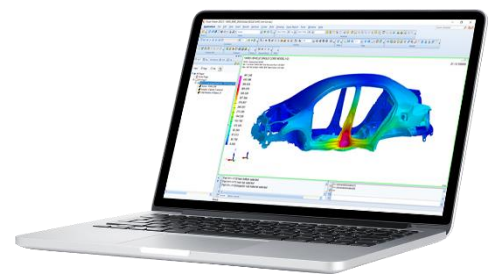
Training Program

Day 1

- ✓ Animations
- ✓ Contour displays
- ✓ Template management
- ✓ Curve plots creation
- ✓ Curve operations and export
- ✓ Synchronization of results and models
- ✓ Visualization of differences in results
- ✓ Overlaying of simulations and videos
- ✓ Report generation
- ✓ Introduction to session files

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Virtual Seat Solution (VSS)

VSS Learning Path

Aerospace & Defense

Automotive

Heavy Machinery

Trainings without a marker are not industry specific.

VSS - Seat Modeling

VSS - Seat Trim Manufacturing

VSS - Seat Static Comfort

VSS - Seat Dynamic Comfort

VSS - Seat Thermal Comfort

VSS - Seat Whiplash Test
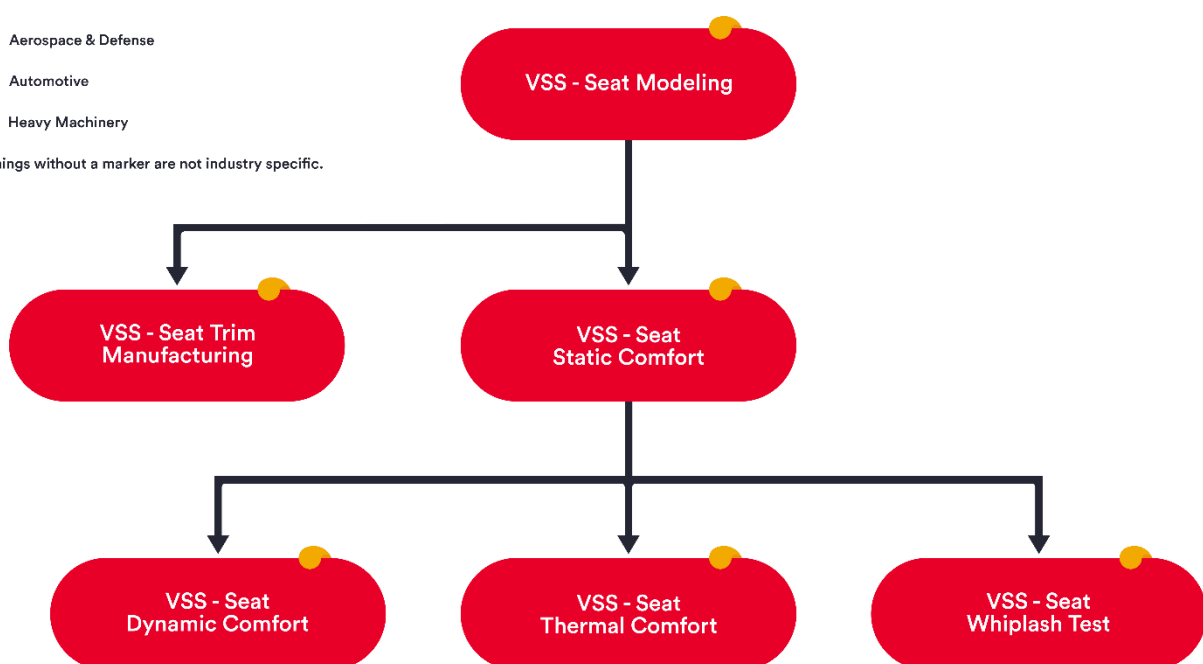
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VSS - Seat Modeling

Learn how to prepare a seat model ready to be used for virtual performance testing for the automotive industry.

Audience

Seat Designers and CAE Engineers.

Prerequisites

Basic knowledge on Finite Element Analysis helps but is not mandatory..

Description

In this course, you will learn how to model a seat efficiently with guided workflows.

Training Program

Day 1

- ✓ Seat Modelling for Static, Safety, Crash and Dynamic Comfort Applications.
- ✓ Hands-on with Automotive cases.

VSS - Seat Trim Manufacturing

Learn how to design optimal cover flattened patterns without defects such as wrinkles. For automotive industry.

ADVANCED   1 DAY

Audience

Seat Designers and CAE Engineers.

Prerequisites

Completion of VSS-Seat Modeling Training

Description

In this course, you learn how to design virtually seat cover and foam and test their assembly.

Training Program

Day 1

- ✓ Compute optimal cover flattened patterns and uncompressed foam block from 3D Seat Trim Outline.
- ✓ Simulate cover patterns assembly by sewing around foam block to detect potential defects such as wrinkles
- ✓ Hands-on with automotive cases

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VSS - Seat Static Comfort

Learn how to choose trim materials and shape to optimize seating comfort. For automotive industry.

ADVANCED   **1 DAY**

Audience

Seat Designers and CAE Engineers.

Prerequisites

Completion of VSS-Seat Modelling Training

Description

In this course, you will learn how to reach your targeted H-Point and improve the pressure distribution.

Training Program

Day 1

- ✓ Trim materials choice to reach targeted H-Point.
- ✓ Preliminary safety testing
- ✓ Seat shape morphing to improve pressure distribution for several occupants.
- ✓ Indentation tests.
- ✓ Hands-on with automotive cases

VSS - Seat Dynamic Comfort

Learn how to identify seat ability to isolate its occupant from car vibrations. Learn to modify seat structure to avoid proximities between seat and car natural frequencies for automotive industry.

Audience

Seat Designers and CAE Engineers.

Prerequisites

Completion of VSS-Static Comfort Training

Description

In this course, you will learn how to compute seat transfer function and work on structure natural frequencies.

Training Program

Day 1

- ✓ Establish transfer function and S.E.A.T. index for occupied seat and low frequency range
- ✓ Perform modal analysis of the seat for higher frequencies and modify the seat to change some natural frequencies.
- ✓ Hands-on with automotive cases

VSS - Seat Whiplash Test

Learn how to evaluate seat ability to protect its occupant from whiplash injury based on different protocols for automotive.

Audience

Seat Designers and CAE Engineers.

Prerequisites

Completion of VSS-Static Comfort Training

Description

In this course, you will learn how to virtually test your seat for several Whiplash Protocols.

Training Program

Day 1

- ✓ H-Point and backset computation based on HRMD dummy seating.
- ✓ BioRID dummy seating
- ✓ BioRID sled test according EuroNCAP
- ✓ Other protocols are available and work similarly to EuroNCAP implementation.
- ✓ Hands-on with automotive cases
- ✓ (Optional Add-On): Process of FMVSS 207/210 (USA Standard) Protocol, to test the strength of the seat structure and belt anchorages for the correct protection of an occupant during a crash

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VSS - Seat Thermal Comfort

Learn how to evaluate seat thermal performance based on comfort score and energy consumption for automotive industry.

ADVANCED **1 DAY**

Audience

Seat Designers and CAE Engineers.

Prerequisites

Completion of VSS-Static Comfort Training

Description

In this course, you will learn how to optimize seat heating equipment for lower energy consumption and maximized comfort.

Training Program

Day 1

- ✓ Add Thermal Comfort Modelling to Seat model
- ✓ Thermal Performance of Seat Occupied with Human Model
- ✓ Optional - Thermal Performance of Seat Occupied with STAN Thermal Dummy (Thermetrics) Model

VA One

VA One Learning Path

Aerospace & Defense
Automotive
Heavy Machinery

Trainings without a marker are not industry specific.

VA One - FE-BEM - General Applications

VA One - FE-BEM for Space Structural Qualification

VA One - SEA - General Applications

VA One - SEA for Aerospace Applications

VA One - SEA for Automotive Applications

VA One - Hybrid Modeling

VA One - Scripting

VA One - Ray Tracing

NOVA - Noise Control Treatment Simulation

FOAM-X - Porous Material Characterization

Visit Training Schedule | myESI to register
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KEYSIGHT

VA One - FEM/BEM for general applications

Learn to perform acoustic environment qualification. The course aims at mastering the finite element (FEM) and boundary element modules (BEM) for vibroacoustic simulation applications. Learn how to ensure your model accuracy by learning about the best modeling guidelines and practices.

BASIC

2 DAYS

Audience

NVH Engineers, Acoustic Test Engineers, etc.

Prerequisites

Basic knowledge of the Finite Element Method (FEM).

Description

This course will include an introduction to VA One (Graphical user interface) and cover the finite element method and Boundary Element Method (BEM) background theory and usage. The content with individual cover features as well as coupled models.
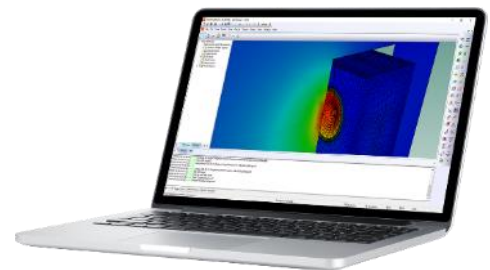
Training Program

Day 1 - Introduction and FEM

- ✓ Introduction to the Graphic User Interface
- ✓ Modal frequency response theory overview
- ✓ Structural Finite Element Subsystems
- ✓ Hands-on: vibration prediction on an automotive chassis.
- ✓ Damping models review
- ✓ Acoustic Finite Element Subsystems
- ✓ Structural Acoustic Coupling
- ✓ Hands-on: front loader cabin analysis

Day 2 - BEM

- ✓ Boundary Element Method
- ✓ Hands-on: scattering analysis
- ✓ Hands-on: transmission loss of a plate
- ✓ Coupled Boundary Element - Finite Element Models
- ✓ Dynamic Stresses
- ✓ Hands-on: Speaker simulation

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VA One - FEM/BEM for Space Structural Qualification

Learn to perform acoustic environment qualification for space structures.
The course aims at obtaining the vibration response, dynamic stresses, or internal cavities acoustic levels for components, entire payload, or launch vehicle subjected to a launch environment.

BASIC

2 DAYS

Audience

NVH Engineers, Acoustic Test Engineers, etc.

Prerequisites

Basic knowledge of the Finite Element Method (FEM).

Description

This course will include an introduction to VA One (Graphical user interface) and cover the finite element method and Boundary Element Method (BEM) background theory and usage.

Training Program

Day 1 - Introduction and FEM

- ✓ Introduction to the Graphic User Interface
- ✓ Modal frequency response theory overview
- ✓ Structural Finite Element Subsystems
- ✓ Hands-on: vibration prediction on a satellite model
- ✓ Damping models review
- ✓ Acoustic Finite Element Subsystems
- ✓ Structural Acoustic Coupling
- ✓ Hands-on: prediction of the internal sound pressure levels of a fairing

Day 2 - BEM

- ✓ Boundary Element Method
- ✓ Coupled Boundary Element - Finite Element Models
- ✓ Dynamic Stresses
- ✓ Hands-on: FE-BEM coupled model of a satellite subjected to a diffuse acoustic field.

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VA One - SEA General Applications

Learn how to use VA One SEA module to solve high frequency vibroacoustic problems where deterministic methods cannot be used.

Audience

NVH Engineers, Acoustic Test Engineers, etc.

Prerequisites

Basic knowledge of acoustic, NVH, and of CAE software.

Description

This course focuses on an introduction to VA One SEA. This course includes the building of simple SEA subsystems as well as performing analysis and using noise control treatments.

Training Program

Day 1 - Introduction to VA One and SEA

- ✓ Basics of Statistical Energy Analysis
- ✓ Introduction to VA One (GUI, Database)
- ✓ SEA subsystems (structural and acoustic)
- ✓ Exercises: basic examples for the trainee to understand how to build and solve a model.

Day 2 - Introduction to VA One and SEA

- ✓ SEA subsystems (structural and acoustic)
- ✓ Inputs and Analysis
- ✓ Noise Control Treatments
- ✓ Introduction to specific application (Trim Modeler, Virtual TL, Foam)
- ✓ Overview of the industrial application (auto, aerospace, marine)

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KEYSIGHT

VA One - Scripting

Learn how to use python scripting to interact with the VA One models. The course will show how to write simple routines to accelerate VA One productivity. User will understand how to extract model data, interact with the external files or how to populate custom results using va1 APIs.

ADVANCED   1 DAY

Audience

VA One users who need to develop simple scripts for the result post-processing, up to users who want to develop customized tools which interact with the model and helps to speed-up model building process.

Prerequisites

Completion of either VA One FEM/BEM or SEA General Applications course along with basic knowledge of Python scripting. Be familiar how to define *for, if and functions* statements, along with basic knowledge related to **numpy, scipy, matplotlib** libraries.

Description

This course will include an introduction to VA One Scripting and covers the basic principles of scripting in VA One environment. User will get deeper knowledge how to interact with the model and how to write simple to more advanced scripts.

Training Program

Day 1

- ✓ Introduction into VA One Python Scripting
- ✓ Working with the (API) Reference manual
    - o ClassID concept
    - o VA One iterators
    - o VA One Database browsing and finding va1 objects
- ✓ Interaction with the 3D Window
- ✓ Interaction with the Browser Window
- ✓ Definition of a new object in database
- ✓ Results and Graphs
- ✓ Hands-on

VA One - SEA for Automotive Applications

Learn how to build a SEA model of a car and perform sound pack analysis.

Audience

NVH Engineers, Acoustic Test Engineers, etc.

Prerequisites

Basic knowledge of acoustic, NVH, and of CAE software.

Description

This course focuses on an introduction to VA One SEA for automotive applications. The trainee will learn how to build a SEA model of a vehicle from a FE Model to be able to perform sound pack analysis and interior noise performance assessment.
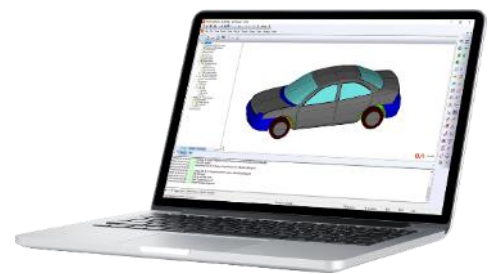
Training Program

Day 1 - Introduction to VA One and SEA

- ✓ Basics of Statistical Energy Analysis
- ✓ Introduction to VA One (GUI, Database)
- ✓ SEA subsystems and Analysis
- ✓ Noise Control Treatments
- ✓ Exercises: basic examples for the trainee to understand how to run a model (TL, Power Inputs)

Day 2 - SEA for Automotive 1

- ✓ Focus on how to build the structure and cavities
  - o State-of-the-art partitioning
  - o Interior and exterior cavities
  - o Diffraction and junction modifications
- ✓ Trim Modeler and NCT
  - o How to model and apply porous media
- ✓ Exercises: build parts of a vehicle (Firewall, wheel arches) with Cavities and perform subsystem TL

Day 3 - SEA for Automotive 2

- ✓ SEA model sanity check
- ✓ Loads and input to the model
- ✓ Perform various studies on the SEA model:
  - o Contribution analysis
  - o Transfer Function
  - o Interior noise performance enhancement
- ✓ Exercises: perform various analyses on the complete SEA model

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VA One - SEA for Aerospace Applications

Learn to model launch vehicles and aircraft using Statistical Energy Analysis. The course will cover the fundamentals of SEA and model construction focusing on a launch vehicle and an aircraft. Noise control treatment design and applications will also be part of this course.

Audience

CAE engineers, model designers, etc.

Prerequisites

Basic knowledge of the Finite Element Method (FEM) and Vibro-Acoustic Analyses.

Description

This course will include an introduction to VA One (Graphical user interface) and cover the statistical energy analysis background theory and usage. Subsystem constructions from a finite element model will be covered.
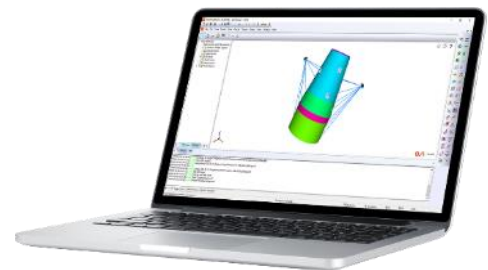
Training Program

Day 1 - Introduction to SEA and launch vehicles

- ✓ Introduction to the Graphic User Interface
- ✓ SEA Theory background
- ✓ Subsystem creations
- ✓ Hands-on: Launch Vehicle Model creation

Day 2 - Noise control treatment design and aircraft modeling

- ✓ Noise Control Treatment simulation basics
- ✓ Tutorial: Noise Control Treatment Design for a fairing
- ✓ Ribbed panels essentials
- ✓ Double wall junction theory
- ✓ Hands-on: Aircraft Model construction from finite element model

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VA One - Hybrid General

Learn how to use the FE-SEA hybrid method to solve vibro-acoustics in the mid-frequency range.

Audience

NVH CAE Engineers, Acoustic Test Engineers

Prerequisites

Completion of VA ONE - SEA - General Applications Training

Description

This course focuses on an introduction to VA One hybrid FE/SAE, including the theory of this method as well as the coupling between different structural and acoustic entities.
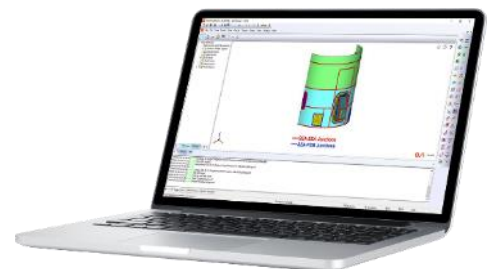
Training Program

Day 1

- ✓ Introduction to the hybrid FE/SEA method
- ✓ Introduction to the FE and SAE modules of VA One
- ✓ Coupling between FE structure and SEA Structure
- ✓ Coupling between FE structure and SEA acoustic
- ✓ Use of the FE / SEA method in an industrial case

KEYSIGHT

VA One - Ray Tracing

Understand the theory and applications of the ray tracing technique. Design and analyze using the ray tracing module of VA One to solve acoustic problems.

BASIC

1 DAY

Audience

NVH, CAE engineers, model designers, and acoustic engineers.

Prerequisites

Basic knowledge of the Finite Element Method (FEM) and Vibro-Acoustic Analyses.

Description

This course focuses on an introduction to ray tracing steady-state analysis and speech clarity.
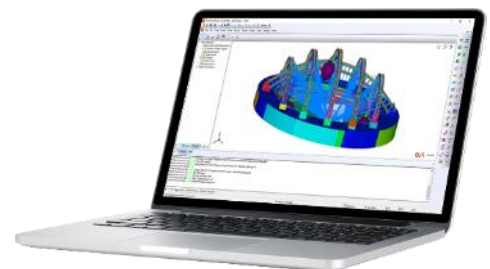
Training Program

Day 1

- ✓ Ray Tracing Theory
- ✓ Introduction to VA One (GUI, Database)
- ✓ General Usage of Ray Tracing
    - o RT Domain
    - o Reflecting Surface
    - o Source and Directivity
- ✓ Steady State Analysis
- ✓ Speech Clarity
- ✓ Exercises: basic examples along the training session for the trainee to understand how to build and solve a model.

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for training courses and select available dates.

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KEYSIGHT

Nova - Noise Control Treatment Simulation

Learn to simulate and optimize the performance of different noise control treatment lay-ups using the transfer matrix method. Obtain specific metrics such as transmission loss and absorption for a given treated panel.

BASIC

0.5 DAYS

Audience

CAE engineers, model designers, etc.

Prerequisites

None

Description

This course will include an introduction to NOVA (Graphical user interface) and cover the transfer matrix method background theory and usage. The content with cover individual features as example use cases.
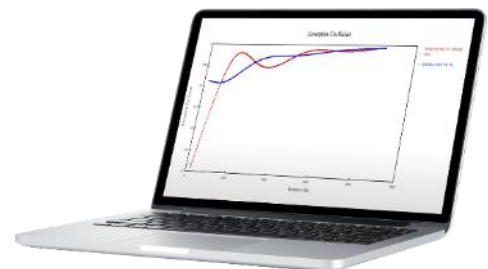
Training Program

Day 1

- ✓ Noise control treatment modeling overview
- ✓ Transfer Matrix Method overview
- ✓ Introduction to the Graphic User Interface
- ✓ Single-layer treatment simulation
- ✓ Transmission loss calculation
- ✓ Absorption calculation
- ✓ Perforation model

KEYSIGHT

FOAM-X - Porous Material Characterization

Learn to post-process impedance tube data to characterize Biot parameters in foam samples.

BASIC

0.5 DAYS

Audience

CAE engineers, model designers, etc.

Prerequisites

None

Description

This course will give an overview of the software and a general description of the inverse characterization method. Sample data sets will be used to go over the different features of the software.

Training Program

Day 1

- ✓ Introduction to the user interface
- ✓ Theory overview
- ✓ Hands-on: characterization of foam and fiber samples

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OpenFOAM

OpenFOAM Learning Path
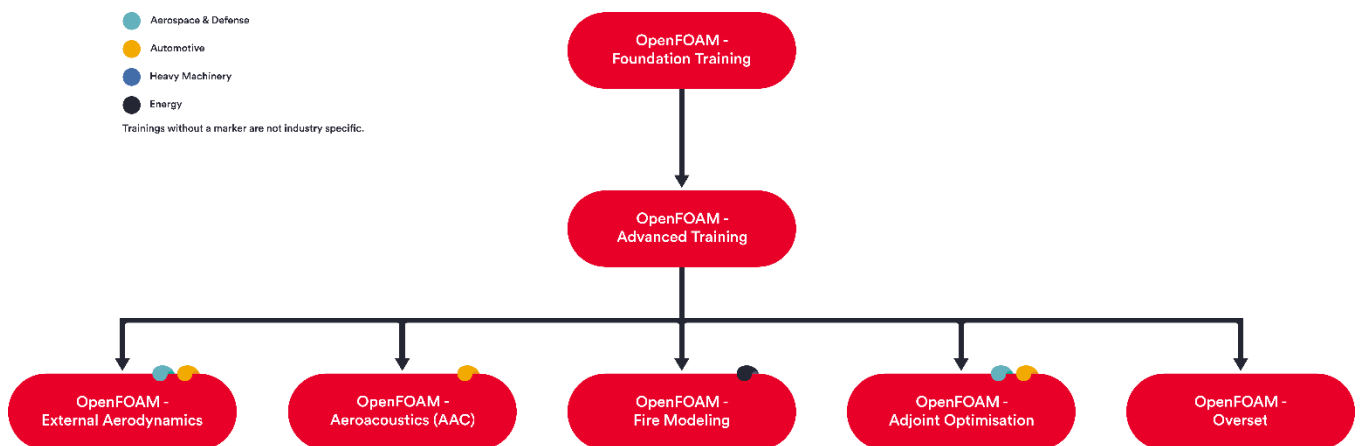
OpenFOAM - Foundation Training

Learn how to apply OpenFOAM to setup, run, and post-process CFD problems on small cases.

BASIC

2 DAYS

Audience

CFD Engineers.

Prerequisites

Basic knowledge of Linux, C++, and Computational Fluid Dynamics (CFD) are beneficial

Description

This course includes an introduction to OpenFOAM environment. Participants undertake exercises in simulating cases and programming in OpenFOAM using ESI's Cloud-based HPC computing platform. All work from the training will be stored on the cloud and participants may download all the work and exercises at the end of the training. This training doesn't teach any programming or source code modifications.

Training Program

Day 1

- ✓ Background in the use of Linux/UNIX
- ✓ OpenFOAM applications and how to use them
- ✓ Basic meshing with a block-structured mesh generator
- ✓ Field initialization and general boundary conditions
- ✓ Selecting physical models and setting parameters
- ✓ Solution monitoring and control
    - o plotting residuals
    - o plotting continuity errors
- ✓ Mesh conversion (example from Ansys)
- ✓ Hands-on
    - o Backward-facing step
    - o Dam break

Day 2

- ✓ Reynolds-averaged simulation for turbulence
    - o setting boundary conditions
    - o wall functions
- ✓ Post-processing tools and visualization
- ✓ Mesh manipulation
- ✓ Running in parallel
- ✓ Creating animations
- ✓ Introduction to C++ and its use in OpenFOAM
    - o Code structure and compilation
    - o Code walk-through for a simple utility
    - o The important classes in OpenFOAM
- ✓ The finite volume method and PISO/SIMPLE/PIMPLE algorithms
- ✓ Post-processing with Function Objects
- ✓ Hands-on
    - o pitzDaily

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OpenFOAM - Advanced Training

Learn how to use effectively OpenFOAM on real engineering problems and develop the toolbox to suite your needs. It covers general use and programming of OpenFOAM, building on topics presented earlier in the Foundation Course.

BASIC | 2 DAYS

Audience

CFD Engineers.

Prerequisites

Completion of OpenFOAM - Foundation Training

Description

This course covers advanced topics on OpenFOAM. Participants undertake exercises in simulating cases and programming in OpenFOAM using ESI's Cloud-based HPC computing platform. All work from the training will be stored on the cloud and participants may download all the work and exercises at the end of the training.This training doesn't teach any programming or source code modifications.

Training Program

Day 1

- ✓ Advanced meshing in OpenFOAM with snappyHexMesh
    - o Effective use of snappyHexMesh
    - o Building cell layers
    - o Checking mesh quality
- ✓ Selecting discretization schemes with respect to mesh quality
- ✓ Tuning of linear solvers and algorithms
- ✓ Setting boundary regions and conditions
- ✓ On-the-fly post-processing
- ✓ Hands-on
    - o Motorbike

Day 2

- ✓ Overview of capabilities including
    - o Multiphase flows
        - ▪ Interface capturing, e.g., Volume of Fluid (VoF)
        - ▪ Euler-Euler methods
        - ▪ Lagrangian particles
    - o Dynamic meshes including overset
    - o Heat transfer including radiation
- ✓ Dynamic code
    - o Use of dynamic code customizations in OpenFOAM setup

Boundary conditions in OpenFOAM explained

- o implementation of boundary conditions
- o turbulent inlet profile
- o time-varying conditions
- o mixed boundary conditions
- ✓ Post-processing with Function Objects

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OpenFOAM - External Aerodynamics

Learn how to use effectively OpenFOAM to vehicle external aerodynamics simulation.

Audience

CFD Engineers with interest in external aerodynamics.

Prerequisites

Completion of OpenFOAM - Advanced Training

Description

The course is directed towards the automotive industry but is also beneficial to other industries. We concentrate mainly on advanced meshing techniques with snappyHexMesh and workflow leading to RANS, uRANS and hybrid-turbulence simulation using DES. In the second half we concentrate on the best practices for parallelisation of the larger runs and methods to achieve and maintain good convergence.

Training Program

Day 1

- ✓ Geometry and meshing
  - o Review of vehicle geometry, underhood, underbody, …
  - o Wind tunnel setup
  - o Comprehensive study of snappyHexMesh
  - o Mesh structure, best practice for mesh sizes and distributions
  - o How to treat multiple zones for fans and heat exchangers
  - o Meshing in parallel
- ✓ Case setup
  - o Turbulence models : RANS, LES, DES, DDES
  - o Heat exchanger and fan model setup
  - o Field initialization and boundary conditions
  - o Best practice for selecting models and setting parameters
  - o Set up on-the-fly post-processing to calculate drag and lift coefficients
  - o Solution monitoring and control
  - o Running in parallel; steady state and transient
- ✓ Post-processing using ParaView
  - o Flow field interrogation
  - o Cp, total pressure, and Cp total calculation
  - o Component drag contribution such as heat exchangers
  - o Drag development plot along the vehicle
  - o Iso-surface of total pressure zero
  - o Creating animations for transient simulation

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OpenFOAM - Aeroacoustics (AAC)

Learn how to use effectively OpenFOAM to Aeroacoustics, Hydroacoustics and Hydro/Aero-Vibroacoustics simulations. Learn industrial best practices. Learn AAC theory and modeling options to improve your simulations accuracy, stability, and robustness.

Audience

CFD Engineers with interest in Aeroacoustics, Hydroacoustics and Hydro/Aero-Vibroacoustics.

Prerequisites

Completion of OpenFOAM - Advanced Training

Description

This course covers Theoretical and Applied concepts in Computational Aeroacoustics (CAA) using OpenFOAM, touching on progressive Multiphysics design challenges, e.g. Aero-Vibro-acoustics (AVA). The course organisers are leading experts in flow-noise source prediction, propagation and noise abatement in all engineering sectors including transportation (Automotive, Aerospace, Marine, Rail), energy, power generation, building environment and turbomachinery.

Training Program

Day 1

- ✓ Basics - aeroacoustics source and propagation mechanisms, including a shallow dive into classical theory
- ✓ Narrowband (tonal) and broadband flow noise
- ✓ Spatial and Temporal considerations (mesh and time-step)
- ✓ Turbulence and wall-modelling
- ✓ Steady-state: fast approximations of source mechanisms and ratings
    - o Surface based (shear-flow correlation)
    - o Volume based (Lilley-Proudman correlation)
- ✓ Transient:
    - o Appropriate physics modelling and boundary conditions for aeroacoustics
    - o Numerical control settings in OpenFOAM
- ✓ Pure acoustics in OpenFOAM?
- ✓ Spectral postprocessing using the built-in OpenFOAM point-based and surface-based temporal-Fourier analysis tools
- ✓ Noise Propagation to the far-field using acoustics analogies, e.g., Curle
- ✓ General hints and tips
- ✓ Insights into coupling with Acoustic propagation codes for acoustics and vibroacoustics using SEA, FEA, and BEM

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OpenFOAM - Fire Modeling

Learn how to use effectively OpenFOAM to fire safety applications for the design of buildings, car parks, tunnels, and others.

Audience

CFD Engineers with interest in in fire modeling.

Prerequisites

Completion of OpenFOAM - Advanced Training

Description

The course summarises theoretical background behind fire safety simulations including advanced turbulence modelling with LES; combustion modelling in OpenFOAM as well as Lagrangian multiphase flows. A specific chapter is dedicated to the meshing of arbitrary geometry with snappyHexMesh. During the practical sessions, participants will compare different modelling approaches with the well known Steckler validation case. Further cases provide participants with the opportunity to investigate, discuss and understand more complex fire modelling scenarios.
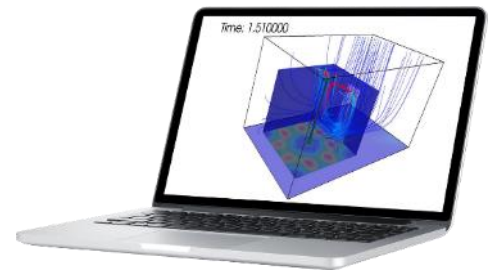
Training Program

Day 1

- ✓ OpenFOAM capabilities for fire modelling
- ✓ Best Practices for the meshing of complex geometries using snappyHexMesh
- ✓ Turbulence modelling with LES and DES
- ✓ Combustion modelling - reaction kinetic schemes, EDM
- ✓ Radiation model setup - P1, DOM
- ✓ Smoke extraction and ventilation
- ✓ Modelling jet fans, ventilators, and other boundary conditions
- ✓ Best practices for numerics and efficient parallel running
- ✓ Hands-on:
  - o Steckler validation case

KEYSIGHT

OpenFOAM - Adjoint Optimization

Learn how to use effectively the adjoint method in aerodynamic and hydrodynamic shape optimization using OpenFOAM

Audience

CFD Engineers with interest in CFD-based shape optimization and the use of sensitivity maps.

Prerequisites

Completion of OpenFOAM - Advanced Training

Description

The course covers both the computation of the so-called sensitivity maps and the full optimisation process, including shape and mesh morphing. The theoretical background is accompanied by hands-on training focusing on the set-up of the OpenFOAM adjoint solver, discussing its capabilities and following the steps required to perform a shape optimisation loop. The first part of the course introduces the continuous adjoint method applied to fluid mechanics with a focus om the key features that make it a valuable tool for industrial problems.

The course is organised with collaboration of leading experts in the development of continuous adjoint methods in aerodynamics, with a rich portfolio of applications in internal and external aerodynamics, e.g. cars, aircraft, turbo machinery, from the group of Prof. K.C. Giannakoglou, National Technical University of Athens (NTUA)..

Training Program

Day 1 & 2

- ✓ The continuous adjoint in the Official release of OpenFOAM
- ✓ Introduction to the continuous adjoint method. Examples relating to 1D flow of incompressible fluids
- ✓ Interpretation of the adjoint fields
- ✓ Development of the continuous adjoint method in multi-dimensional flows
- ✓ Handling of various objective and constraint functions
- ✓ Adjoint methods for turbulent flows
    - o The adjoint to the Reynolds-Averaged Navier-Stokes equations
    - o Adjoint to the Spalart-Allmaras turbulence model
- ✓ Continuous adjoint methods and grid sensitivities
- ✓ Use of sensitivity maps
- ✓ Workflow for automated shape optimization loops
- ✓ Hands-on:
    - o internal and external flows

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OpenFOAM - Overset

Learn how to use effectively overset (chimera) meshing in OpenFOAM in all engineering sectors, especially transportation: Automotive, Aerospace, Marine, Rail.

Audience

CFD Engineers with interest in overset (chimera) meshing method.

Prerequisites

Completion of OpenFOAM - Advanced Training

Description

The course covers theoretical and applied concepts using overset (chimera) meshing in OpenFOAM. The training provides examples of process and best practice, which are useful to existing OpenFOAM users wishing to broaden their application knowledge of OpenFOAM towards using overset meshing as an alternative to mesh morphing or sliding interfaces.
All features demonstrated in this course are part of the Official release of OpenFOAM.
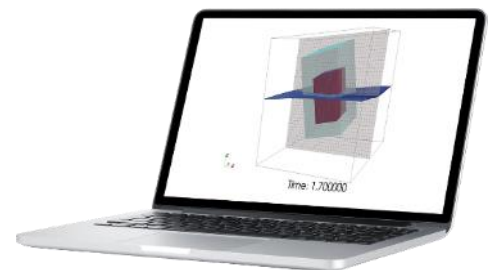
Training Program

Day 1

- ✓ Meshing for overset
    - o basics of background and foreground mesh generation, and assembly
    - o interpolation controls, solver settings
- ✓ Heat conduction
    - o static aerofoil at several angle of attacks
    - o transient cylinder shedding
    - o counter-rotating blades
    - o 6DoF floating body
- ✓ Limitations, e.g., object collisions
- ✓ Application examples
    - o Overtaking vehicles
    - o Passing high speed trains
    - o Maneuvering ship including hull, propeller, and rudder interaction
    - o Propeller fan
- ✓ Post-processing
- ✓ Running in parallel

SimulationX

SimulationX Learning Path
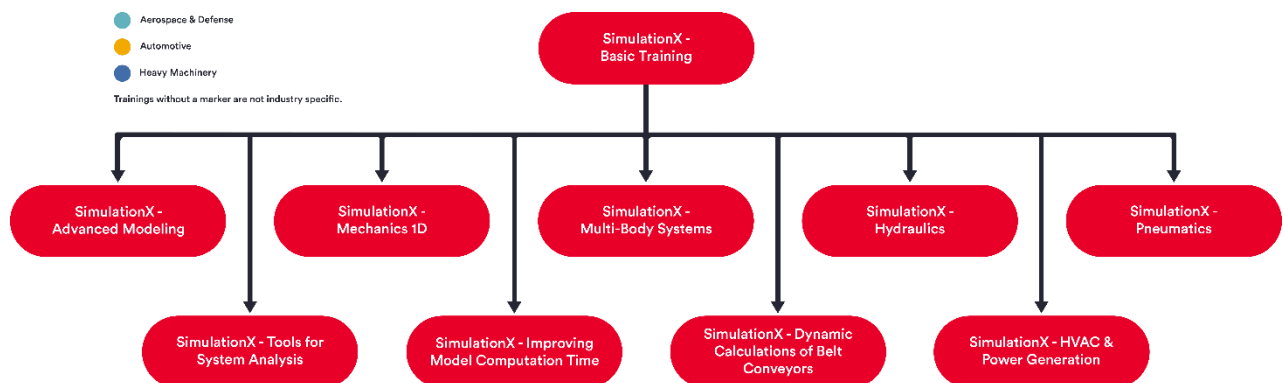
SimulationX - Basic Training

Learn about and understand the basic aspects of system modeling. Get an insight into the functional range of the software and learn interesting facts about the possible applications for modeling, simulating, and analyzing complex technical systems.

Audience
All

Prerequisites
None

Description

This course focuses on the introduction to SimulationX, starting with the exploration of the Graphical user interface. Participants learn how to set up a model, how to simulate them, and evaluate the results in the Graphical User Interface. Several exercises will support the handling of SimulationX. Furthermore, you will gain the ability to create your own models for individual applications.

Training Program

Day 1

- ✓ Explanation of the graphical user interface
- ✓ Basics for network modeling and signal flow-oriented modeling, as well as the creation of multi-domain models
- ✓ Overview of the range of functions, features, and use of the libraries
- ✓ Parameterization:
    - o parameter properties
    - o mathematical functions, logical conditions, variables, etc.
    - o curves and characteristics.
- ✓ Hierarchical modeling (sub-structuring)
- ✓ Referencing: Cross-references to variables and parameters within the model
- ✓ Derivation of new model types
- ✓ Calculations:
    - o Concept
    - o transient simulation
    - o calculation of consistent initial values
    - o natural frequencies and mode shapes
- ✓ Result presentation, evaluation, and analysis
- ✓ Data exchange and interfaces
- ✓ Exercises:
    - o One-mass oscillator
    - o Calculation of the volume of a cuboid
    - o Sweep excitation mode

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KEYSIGHT

SimulationX - Advanced Modeling

Learn more about the flexible modeling capabilities in SimulationX to build user-adapted models with more complexity or own model libraries.

ADVANCED

1 DAY

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

The focus of this course is the vast modeling possibilities of SimulationX. Participants will learn how to create extensive libraries via the *TypeDesigner* (integrated Modelica wizard) without programming knowledge. Furthermore, you will learn how to create your own functions, calculation blocks, model types, and model libraries. Many examples demonstrate the handling.

Training Program

Day 1

- ✓ Type and library management
- ✓ Creating new libraries
- ✓ Creating own types
- ✓ Using reusable blocks and functions
- ✓ Clear design of property dialogs
- ✓ Branching of equation systems
- ✓ Use of characteristic curves and maps
- ✓ Implementation of loops and iteration procedures
- ✓ Implementation of a database connection
- ✓ Exercises (selection of these will be used in training):
    - o Different spring/damper models
    - o Function for tension/compression stress calculation
    - o Rope model
    - o PWM (pulse width modulation, three variants)
    - o Euclidean algorithm
    - o Intersection of two curves with the Newton algorithm
    - o Management of data sets by means of records, among other things

SimulationX – Tools for System Analysis

This course provides a deep insight in the usage of different system analysis tools in SimulationX. The usage of several tools for system analysis is discussed in detailed with theoretical and practical applications. At the end of the training course, participants will learn more about the Variant Wizard for automated variant calculation.

Audience

All

Prerequisites

Completion of SimulationX – Basic Training

Description

In this course, the participants will learn the usage of the different system analysis tools provided within SimulationX.

To set the scene, the course starts with an overview of the computation methods. Next, a deeper insight in the natural frequency analysis is given with several hints for usage and interpretation of the results.

For order analysis, the two different tools provided within SimulationX are described: the external order analysis tool and the *Pre- and Post-Processing Tools* package. This is followed by the Input Output Analysis and the Frequency response function analysis. In each of those chapters, the knowledge is introduced with some theoretical background and then practically applied at demonstration models and partly with hands-on exercises.

The training ends with the exploration of the Variants Wizard, suited for automated variant calculation.
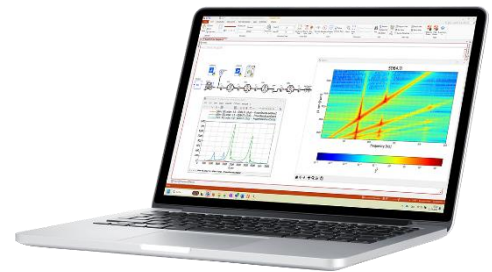
Training Program

Day 1

- ✓ Overview on Model Computation Methods
- ✓ Natural frequencies and Mode Shapes
- ✓ Spectral Analysis
  - o *Order Analysis Tool*
  - o *Pre- and Post-Processing Tools*
- ✓ Input-Output Analysis
- ✓ Frequency Response Function
- ✓ Variants Wizard
- ✓ Demonstration models:
  - o 1D-torsional powertrain
  - o several theory illustration models

Necessary Software Installation:

- o External Order Analysis Tool
- o Python

SimulationX – Improving Model Computation Time

This course provides a deep insight on the influencing parts on model computation time, on how to detect them and how to improve your SimulationX model. Several aspects as natural frequencies analysis as well as the usage of the Performance Analyzer are discussed to find causes for performance decrease. Another aspect is choosing the right solver with an extra chapter for real time capability. The content starts with theoretical overview followed by practical applications with SimulationX.

ADVANCED   0.5 DAYS

Audience
All

Prerequisites
Completion of SimulationX – Basic Training

Description

In this course, the participants will learn possible root causes for performance decrease and how to improve them. To set the scene, the course starts with an overview on influences on computation time. The natural frequency analysis and the tool Performance Analyzer allows for detecting the critical elements in the model. In the next chapter, participants will learn about discontinuities and event handling and how they affect the simulation performance. Another topic covered by this training is choosing the right solver. Together with theoretical and practical applications, best practices are shared. This is followed by a deeper insight in necessary model changes for real time capable models, which is necessary for X-in the Loop applications.
In each of those chapters, the knowledge is introduced with some theoretical background and then practically applied with demonstration models or hands-on exercises.
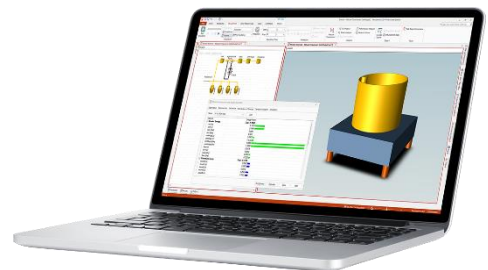
Training Program

Day 1

- ✓ Influences on Model Computation Time
- ✓ Natural frequencies and Mode Shapes
- ✓ Performance Analyzer
- ✓ Discontinuities & Events
- ✓ Overview on Solvers
- ✓ Fixed Step Solvers & Real Time Capability
- ✓ Clean Up of SimulationX Models
- ✓ Practical examples:
  - o Pendulum and Centrifugal Models for Natural Frequency Analysis
  - o using Performance Analyzer with a powertrain model

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- Jumping ball example demonstrating discontinuity handling
- Powertrain model for computation performance comparison
- One-Mass Oscillator – illustration of stability
- Cylinder Drive – Find appropriate step size for Fixed-Step-Solver

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SimulationX - Mechanics 1D

Learn about modeling concept in 1D as well as the basic features of several important 1D mechanic elements, which are also used in other domains in SimulationX. Develop your own 1D elements based on standard elements as, e.g., nonlinear spring-dampers.

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

In this training course on 1D mechanics, participants will learn how to quickly design and analyze linear and nonlinear oscillator chains as well as branched systems from the fields of drive technology, gear technology, mechanisms, aggregate bearing arrangements, and much more, using numerous practical examples. The training focuses on the demonstration of the main features of selected basic elements such as friction, end-stop, transformers, etc.

Training Program

Day 1

- ✓ Conception and structure of libraries
- ✓ Discretization and local definitions in 1D
    - o General modeling basics of 1D models, e.g., sign definitions
- ✓ Properties and use of model elements from 1D-Mechanics library
    - o Demonstration of main features of selected basic elements such as friction, end-stop, transformers, etc.
- ✓ Parameterization and variables
- ✓ Linear elastic structures (modal equivalent system)
- ✓ Linkage to other libraries
- ✓ Performance optimization of models
    - o Mapping of relevant effects
    - o Performance and dynamics analysis
    - o Model reduction
    - o Faster and more efficient calculation
- ✓ Linear system analysis
    - o evaluation and analysis in the time and frequency domain
- ✓ Exercises:
    - o Single-mass oscillator
    - o thrust crank mechanism
    - o Simple planetary gear
    - o User-defined excitation function
    - o zNon-linear couplings (incl. hysteresis function)

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SimulationX - Multi-Body Systems

Learn about MBS (Multi-Body System) mechanics, understand the library, and practically apply the modeling concept with examples.

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

In this training course, participants will learn how to build an MBS model within SimulationX, including the demonstration of basic elements such as rigid bodies, joints, and forces. The proper definition of initial positions is explained. The focus of this training is the correct handling of closed kinematic loops in SimulationX. During the training, numerous practical examples are used for explanation.

Training Program

Day 1

- ✓ Features of Graphical User Interface MBS-Mechanics (3D view, camera control, …)
- ✓ Modelling concept and its implementation in the library:
    - o Modelling and discretization
    - o Spatial position description (global and local coordinate system, orientation, initial position)
- ✓ Properties and use of model elements from the MBS-Mechanics library:
    - o Demonstration of main features of selected elements such as rigid body, joints, forces, constraints, etc.
    - o Model elements with interfaces to other libraries
- ✓ Detailed discussion of open and closed kinematic chains
- ✓ Definition of initial states
- ✓ Exercises:
    - o Industrial robot
    - o McPherson strut (wheel suspension)
    - o Four-bar crank swing arm
    - o Toggle mechanism

SimulationX - Hydraulics

Learn to demonstrate the content and the modeling concept of the hydraulics library. Numerous examples will show how to model and analyze valves, hydraulic drives, end cushioning of cylinders, and proportional directional valves easily and quickly in SimulationX.

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

In this training course, participants will learn how to build hydraulic components and systems. The fluid properties, as well as the different calculation options, are analyzed and explained. Creating your own fluid models is demonstrated using the SimulationX Fluid Designer. The training demonstrates both the detailed modeling of subsystems and the creation of larger systems. The focus of this training is the correct handling of valve and cylinder models as part of the overall system. The user gains insight into the calculation approaches used for hydraulic resistances. Furthermore, interactions between hydraulic components with mechanics as well as with thermal systems are explained. During the training, numerous practical examples are used for explanation.

Training Program

Day 1

- ✓ Modelling and simulating hydraulic components and systems
- ✓ Concept and structure of the hydraulic library
- ✓ Properties and use of model elements
- ✓ Description of fluid characteristics and hydraulic connections
- ✓ Types of calculations for pressure, temperature, and gas proportions
- ✓ Extent of the fluid catalogs, SimulationX Fluid Designer
- ✓ Hydraulic resistances
- ✓ Hydro-mechanical transformers overlap with mechanics
- ✓ Parameterization and variables
- ✓ Overview of further fluid libraries, e.g., "HVAC and Power Generation (Basics)" and "Heat Transfer. "
- ✓ Exercises:
  - o Hydraulic cylinder
  - o Hydraulic damper actuator
  - o Bypass valve
  - o Pilot-operated proportional directional valve

SimulationX - Pneumatics

Learn to model pneumatic valves and drives, clutch actuating systems, pneumatic handling equipment, as well as mixtures of different gases within SimulationX.

ADVANCED 1 DAY

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

In this training course, participants will learn how to build pneumatic components and systems. The fluid properties, as well as the different calculation options, are analyzed and explained. Creating own fluid models is demonstrated using the SimulationX Fluid Designer. The training demonstrates both the detailed modeling of subsystems and the creation of larger systems. The focus of this training is the correct handling of valve and cylinder models as part of the overall system. The user gains an insight into the calculation approaches used for pneumatic resistances. Furthermore, interactions between pneumatic components with mechanics as well as with thermal systems are explained. During the training, numerous practical examples are used for explanation.

Training Program

Day 1

- ✓ Modelling and simulating pneumatic components and systems
- ✓ Concept and structure of the Pneumatic library
- ✓ Properties and use of model elements
- ✓ Description of fluid characteristics and pneumatic connections
- ✓ Pneumatic resistances
- ✓ Extent of the fluid catalogs, SimulationX Fluid Designer
- ✓ Valve models and cylinder drives
- ✓ Pneumatic-mechanical transformers overlap with mechanics
- ✓ Gas mixtures
- ✓ Overview of further fluid libraries, e.g., "HVAC and Power Generation (Basics)," "Heat Transfer" and "Vehicle Pneumatics."
- ✓ Exercises:
    - o Pneumatic check valve
    - o Pneumatic cylinder
    - o Pneumatic damper actuator
    - o Compressed air treatment

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SimulationX - HVAC & Power Generation

Learn to design, build, and analyze models with heat and fluid flows. **Learn to familiarize yourself with the libraries in SimulationX, which are suited for application in the field of HVAC, power generation, and heat transfer.**

ADVANCED

1 DAY

Audience

All, mainly with license content HVAC and Power Lite and Thermal

Prerequisites

Completion of SimulationX - Basic Training

Description

In this training course, participants will learn how to use model systems with heat transfer mainly based on mass flow-based heat transport. The focus is on the basics of the physical libraries for hydraulics, pneumatics, thermal fluid, and heat transfer. The training introduces participants to the modules content, and hands-on training introduces the basic modeling rules of these libraries.

Training Program

Day 1 - Modeling Thermal Systems

- ✓ Modeling of thermal and fluid-filled systems for heat transport
- ✓ Conception and structure of the modules HVAC and Power Lite and Thermal (Basic Elements).
- ✓ Description, properties, and use of the model elements
- ✓ Available fluids in the fluid libraries
- ✓ Basics and model functions
- ✓ Link to other SimulationX libraries
- ✓ Use of steady-state heat exchanger models from the "Heat Transfer" library
- ✓ Exercises:
  - o Cooling of a machine tool with the thermal library
  - o Fluid circuits of a combined heat and power plant CHP plant with the liquids part of the modules
  - o Simulation of an air conditioning system, including thermodynamic state diagrams

SimulationX - Dynamic calculations of belt conveyors

Learn about the possibilities of SimulationX for modeling, simulation, and analyzing the dynamic behavior of belt conveyors.

Audience

All

Prerequisites

Completion of SimulationX - Basic Training

Description

This course gives a comprehensive overview of the dynamic simulation of belt conveyors in SimulationX. In addition to answering classic design questions, dynamic influences are examined, and various drive concepts are tested. During the training, numerous practical examples are used for explanation.

Training Program

Day 1

- ✓ Basics of the Belt Conveyors library
- ✓ Automated creation of belt conveyor models using the model generator
- ✓ Parameter definition
- ✓ Modelling of different drive trains
- ✓ Visualization and interpretation of simulation results
- ✓ Further application of dynamic belt conveyor simulations:
    - o Virtual commissioning
    - o Digital twin
    - o Optimization of parameters
- ✓ Exercises:
    - o Application of the model generator
    - o Controlled and uncontrolled drives

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Smart Manufacturing

PAM-STAMP

PAM-STAMP Learning Path

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KEYSIGHT

PAM-STAMP - Basic Training

Learn how to perform stamping simulation using the PAM-STAMP solution covering the entire tooling process, from forming to final validation.

BASIC

3 DAYS

Audience

CAE engineers, model designers, etc

Prerequisites

Basic knowledge of the stamping process and of CAE software.

Description

This course focuses on an introduction to PAM-STAMP (Graphical user interface, process setup for fast feasibility, and production validation). Participants learn to prepare models, run simulations, and evaluate results via the PAM-STAMP Graphical User Interface.

Training Program

Day 1

- ✓ GUI overview
- ✓ OP manager
- ✓ Tools definitions
- ✓ Blank definitions
- ✓ Single Action process
- ✓ Post-processing
- ✓ Line bead definition
  - o Uniform
  - o Non-uniform

Day 3

- ✓ Cam definitions
- ✓ Blank line compensation
- ✓ Inverse - Flattening
  - o Flattening part
  - o Trimming line development
  - o Flattening on curved surfaces
- ✓ Control Fixture
  - o Gravity on lower
  - o Closing sequence
- ✓ Material creation and MAT-WIZARD

Day 2

- ✓ Geometrical bead from CAD and tools with offset
- ✓ Multi OP
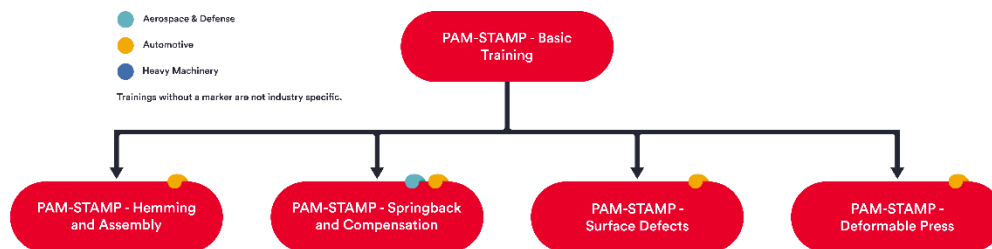- ✓ Trim line compensation
- ✓ Springback compensation
- ✓ Surface reconstruction with iCapp

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for training courses and select available dates.

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BM-Stamp - Basic Training

Learn how to perform stamping simulation using the BM-Stamp solution covering the entire tooling process, from forming to final validation.

BASIC

2 DAYS

Audience

CAE engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process and of CAE software.

Description

This course focuses on an introduction to BM-Stamp (Graphical user interface, process setup for fast feasibility, and production validation). Participants learn to prepare models, run simulations, and evaluate results via the BM-Stamp Graphical User Interface.
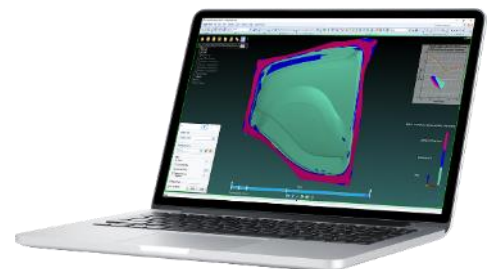
Training Program

Day 1

- ✓ GUI overview
- ✓ Understanding the Templates
- ✓ Geometry Import
- ✓ Process / Tipping definition
- ✓ Blank creation
- ✓ Setting up a Draw Operation
- ✓ Line bead definition
  - o Uniform
  - o Non-uniform
- ✓ Starting simulation

Day 2

- ✓ Setting up the following operations
- ✓ Cam definitions
- ✓ Clamped Springback
- ✓ Post-processing
- ✓ Cosmetic defects
- ✓ Springback compensation

KEYSIGHT

PAM-STAMP - Hemming and Assembly

Learn how to perform hemming and assembly simulation using the PAM-STAMP solution, which covers the entire tooling process to formability and try-out validation.

ADVANCED | 3 DAYS

Audience

CAE engineers, model designers, etc.

Prerequisites

Completion of PAM-STAMP Basic Training.

Description

This course focuses on advanced processes using PAM-STAMP solution (Graphical user interface, process setup for fast feasibility, and production validation). Participants learn to prepare Hemming and Assembly models, run simulations, and evaluate results via the PAM-STAMP Graphical User Interface.
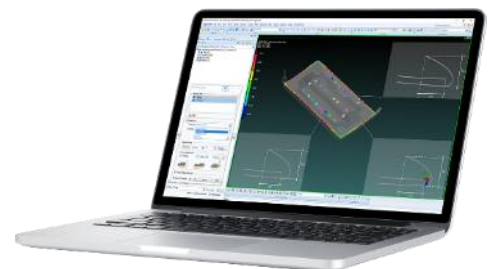
Training Program

Day 1 - Table-Top Hemming

- ✓ Mesh preparation of project part (Nominal)
- ✓ Tabletop setup with stamp history
    - o Gravities (outer and inner)
    - o Pad closing
    - o Steel 45° and 0°
    - o Springback over die blocks
- ✓ Post-processing

Day 2 - Roll Hemming

- ✓ Introduction
- ✓ Roll Hemming setup with stamp history
    - o Gravities (outer and inner)
    - o Pad closing
    - o Robot path definition (3 path)
    - o Springback over die blocks
- ✓ Post-processing

Day 3 - Spot Welding

- ✓ Introduction
- ✓ Clamping and joining setup with stamp history
    - o Simultaneous closing
    - o Sequential closing
    - o Springback over die block after joining
- ✓ Post-processing

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KEYSIGHT

PAM-STAMP - Springback and Compensation

Learn to perform springback compensation using the PAM-STAMP solution, which covers the entire tooling process for validation setup, analysis, and compensation.

ADVANCED

2 DAYS

Audience

CAE engineers, model designers, etc.

Prerequisites

Completion of PAM-STAMP Basic Training.

Description

This course focuses on advanced PAM-STAMP solution usability (Graphical user interface, validation process setup, analysis, and optimization). Participants learn to prepare validation models for springback, run simulations, evaluate results, and run the automatic springback compensation via the PAM-STAMP Graphical User Interface.
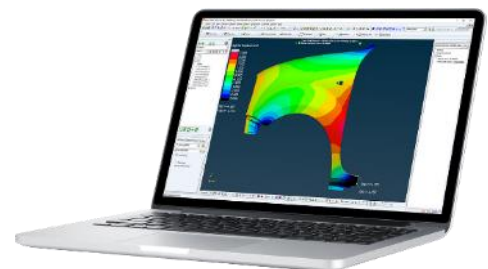
Training Program

Day 1 - Validation Setup

- ✓ Simulation Strategy
    - o Default
    - o Customized
- ✓ Explanation
    - o Initial blank size and Refinement level
    - o Maximal angle
    - o Bending criterion
    - o Speed
    - o Ramp

Day 2 - Springback Compensation

- ✓ Springback compensation
    - o Parameters explanation
    - o Case 1
        - ▪ Free compensation
        - ▪ Restart compensation from the best iteration
            - • New factor
            - • New tolerance
    - o Locked Blank holder
- ✓ ICapp - Cad reconstruction
- ✓ Vector Field export
- ✓ Remarks

PAM-STAMP - Surface Defects

Learn to evaluate surface defects using the PAM-STAMP solution, which covers the entire tooling process for surface defect setup and analysis.

ADVANCED | 1 DAY

Audience

CAE engineers, model designers, etc.

Prerequisites

Completion of PAM-STAMP Basic Training.

Description

This course focuses on advanced PAM-STAMP solution usability (Graphical user interface, surface defect process setup, and analysis). Participants learn to prepare models for surface defects, run simulations, and evaluate results via PAM-STAMP and Visual Viewer Graphical User Interface.

Training Program

Day 1

- ✓ Surface defect introduction
- ✓ Simulation Strategy
    - o Virtual lightroom setup
    - o Optimal meshing parameters for blank & tooling
- ✓ Detecting defect - Contours in PAM-STAMP and Visual Viewer
    - o Skidlines
    - o Springback amplification
    - o Curvature radius
    - o Max contact pressure
    - o Plastic strain
    - o Stress minimum
    - o Wrinkle criteria
    - o Visual Lightroom

PAM-STAMP - Deformable Press

Learn to perform deformable press simulation using PAM-STAMP and Visual Environment, covering the entire tooling process for validation setup and analysis.

Audience

CAE engineers, model designers, etc.

Prerequisites

Completion of PAM-STAMP Basic Training.

Description

This course focuses on advanced PAM-STAMP solution usability (Graphical user interface, validation process setup, deformable tool application, and analysis). Participants learn to prepare validation models using deformable tool, run simulations, and evaluate results via the PAM-STAMP Graphical User Interface.
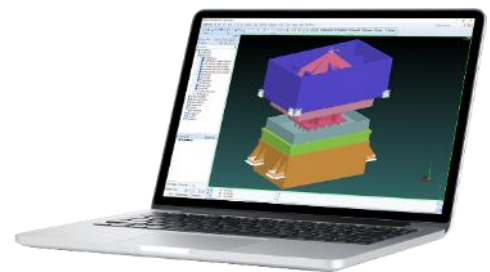
Training Program

Day 1 - Setup and post-processing

- ✓ Deformable tool introduction
- ✓ Mesh 3D model using Visual MESH
- ✓ Setup
- ✓ Post-Processing

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PAM-STAMP - Hydroforming

Learn to perform hydroforming simulation using PAM-STAMP solution, which covers the entire tooling process, from forming to final validation.

Audience

CAE engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process, hydroforming process, and of CAE software

Description

This course focuses on an introduction to PAM-STAMP (Graphical user interface, hydroforming process setup for fast feasibility, production validation, and optimization). Participants learn to prepare models, run simulations, evaluate results, and run optimizations via the PAM-STAMP Graphical User Interface.
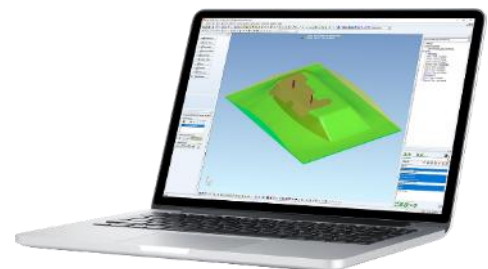
Training Program

Day 1 - Setup and post-processing

- ✓ Hydroforming introduction
- ✓ GUI overview
- ✓ CASE 1 - Fluid cell with Rubber pad
    - o Setup
    - o Post-Processing
- ✓ CASE 2 - Fluid cell on top of Blank
    - o Setup
    - o Post-Processing

Day 2 - Springback and Blank line compensation

- ✓ CASE 3
    - o Springback compensation
    - o Post-processing
    - o I-Capp - Cad reconstruction
- ✓ CASE 4
    - o Blank line compensation
    - o Post-processing
    - o Material creation and MAT-WIZARD

PAM-STAMP - Super Plastic Forming

Learn to perform Super Plastic Forming simulation using PAM-STAMP solution, which covers the entire tooling process, from forming to final validation.

Audience

CAE engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process, Super Plastic Forming process, and of CAE software.

Description

This course focuses on an introduction to PAM-STAMP (Graphical user interface, Super Plastic Forming process setup for fast feasibility and production validation). Participants learn to prepare models, run simulations, and evaluate results via the PAM-STAMP Graphical User Interface.

Training Program

Day 1 - Setup and post-processing

- ✓ Super Plastic forming introduction
- ✓ GUI overview
- ✓ CASE 1 - Super Plastic Forming
  - o Setup
    - Closing
    - SPF
    - Trimming
  - o Post-Processing
- ✓ CASE 2 - Super Plastic Forming
  - o Setup
    - Closing
    - SPF
    - Trimming
  - o Post-Processing

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KEYSIGHT

PAM-STAMP - Hot Forming

Learn to perform Hot Forming simulation using PAM-STAMP solution, which covers the entire tooling process, from forming to final validation.

Audience

CAE engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process, hot forming process, and of CAE software.

Description

This course focuses on an introduction to PAM-STAMP (Graphical user interface, Hot Forming process setup for fast feasibility and production validation). Participants learn to prepare models, run simulations, and evaluate results via the PAM-STAMP Graphical User Interface.

Training Program

Day 1 - Setup and post-processing

- ✓ Hot Forming introduction
- ✓ GUI overview
- ✓ CASE 1 - Feasibility
    - o Setup
    - o Post-Processing
- ✓ CASE 2 - Feasibility
    - o Setup

Day 2 - Setup and post-processing

- ✓ CASE 2 - Feasibility
    - o Post-Processing
- ✓ Main difference between Feasibility and Validation
- ✓ CASE 2 - Validation
    - o Setup
    - o Post-Processing

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PAM-DIEMAKER for Catia - Basic Training

Learn to perform die design using the PAM-DIEMAKER for CATIA V5 workbench from an existing geometry part and design the full stamping process.

Audience

CAE and CAD engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process, die design, and CAE / CAD solutions.

Description

This course focuses on an introduction to PAM-DIEMAKER for CATIA V5 (Graphical user interface for fast feasibility and production validation surfaces). Participants learn about the user interface, how to design a stamping process (Draw, Trimming, Flange, part modification, and additional tools,) and export to PAM-STAMP to run simulations.

Training Program

Day 1

- ✓ GUI introduction
- ✓ Initial setting
- ✓ Draw
  - o Die Starter: Automatic die face designer,
    - ▪ Early Feasibility
    - ▪ Feasibility and Validation
    - ▪ Profile edition
  - o Step-by-step die design
  - o Double part
- ✓ Trimming
- ✓ OP definition
- ✓ Draw-in from PAM-STAMP
- ✓ Segment
- ✓ Notch
- ✓ Cam tipping

Day 2

- ✓ Flange and cam
- ✓ Exporting from PAM-DIEMAKER to PAM-STAMP
- ✓ Additional tools
  - o Geometric drawbeads
  - o DM smart tools
  - o Advanced gainers
  - o Wall opening
  - o Part radius modification
  - o Unfillet corner
  - o Rolling cylinders

KEYSIGHT

Visual Quoting - Basic Training

Learn to perform quoting estimation using the Visual Quoting solution from an existing geometry part.

BASIC

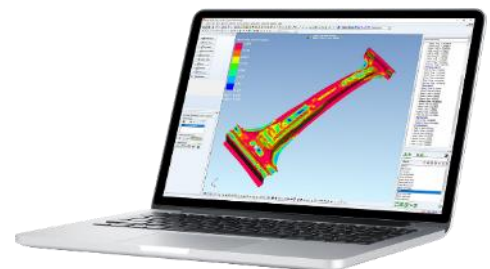0.5 DAYS

Audience

CAE and CAD engineers, model designers, etc.

Prerequisites

Basic knowledge of the stamping process and of CAE software.

Description

This course focuses on an introduction to Visual Quoting (Graphical user interface for cost estimation). Participants learn about quickly develop the flattened part outline and determine the optimal nesting layout in the coil corresponding to the lowest piece price and check the on-step formability.

Training Program

Day 1

- ✓ GUI introduction
- ✓ Part Flattening
- ✓ One step formability analyzes
- ✓ Blank line edition
- ✓ Optimal nesting layout
- ✓ Automatic report

ProCAST

ProCAST Learning Path

- Aerospace & Defense
- Automotive
- Heavy Machinery

Trainings without a marker are not industry specific.

| ProCAST - Investment Casting | ProCAST - Die Casting | ProCAST - Sand Casting | QuikCAST - Die Casting | QuikCAST - Sand Casting |

Visit Training Schedule | myESI to register
for training courses and select available dates.

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ProCAST - Investment Casting

Learn to use ProCAST to create the mesh and set-up for filling and solidification in the case of investment casting process.

Audience

New user of ProCAST™

Prerequisites

Basic knowledge of the investment casting process and of CAE software.

Description

The training content is composed of an combination of theory and practical exercises and will focus on the investment casting process. Participants will learn how to prepare models, run simulations, and evaluate results via ProCAST and its Graphical user's interface: Visual-Environment.
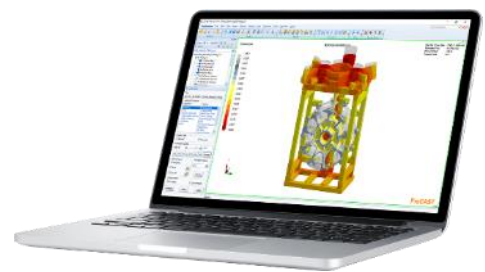
Training Program

Day 1 - Numerical model setup

- ✓ Introduction to Graphical user interface for Meshing and Set-Up
- ✓ CAD import
- ✓ Surface, volume, and shell mesh
- ✓ Filling and solidification setup
- ✓ Case run
- ✓ Practical Exercises based on tutorial

Day 2 - Results Analysis

- ✓ Computation follow-up
- ✓ Results analysis: field of results, slice, Cut-off
- ✓ Results plots
- ✓ Results export: picture, video
- ✓ ESI-Player introduction
- ✓ Practical Exercises based on case launch during Day 1
- ✓ Questions & Answers

Visit Training Schedule | myESI to register
for training courses and select available dates.

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ProCAST - Die Casting

Learn to use ProCAST to create the mesh and set-up for cycling, filling, and solidification in the case of Die casting process.

BASIC | 2 DAYS

Audience
New user of ProCAST™

Prerequisites
Basic knowledge of the Die Casting process and of CAE software.

Description
The training content is composed of an alternance of theory and practical exercises and will focus on the Die casting process. Participants will learn how to prepare models, run simulations, and evaluate results via ProCAST and its Graphical user's interface: Visual-Environment.

Training Program

Day 1 - Numerical Model Setup
- ✓ Introduction to Graphical user interface for Meshing and Set-Up
- ✓ CAD import
- ✓ Surface, volume, mesh
- ✓ Cycling, filling, and solidification setup
- ✓ Case run
- ✓ Practical Exercises based on tutorial

Day 2 - Results Analysis
- ✓ Computation follow-up
- ✓ Results analysis: field of results, slice, Cut-off
- ✓ Results plots
- ✓ Results export: picture, video
- ✓ ESI-Player introduction
- ✓ Practical Exercises based on case launch during Day 1
- ✓ Questions & Answers

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ProCAST - Sand Casting

Learn to use ProCAST to create the mesh and set-up for filling, and solidification in the case of Sand-Casting process.

BASIC **2 DAYS**
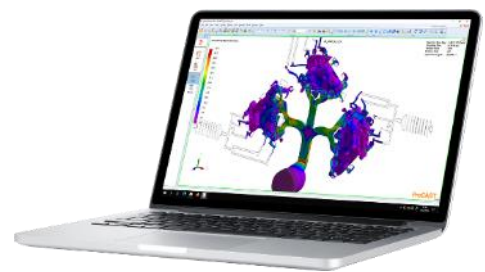
Audience

New user of ProCAST™

Prerequisites

Basic knowledge of the Sand-Casting process and of CAE software.

Description

The training content is composed of an alternance of theory and practical exercises and will focus on the Sand Casting process. Participants will learn how to prepare models, run simulations, and evaluate results via ProCAST and its Graphical user's interface: Visual-Environment.
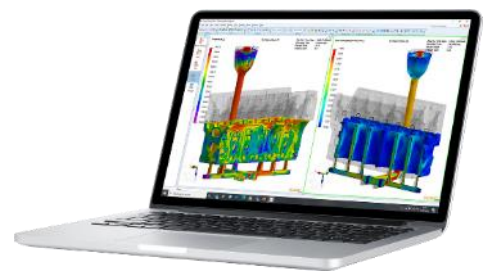
Training Program

Day 1 - Numerical Model Setup

- ✓ Introduction to Graphical user interface for Meshing and Set-Up
- ✓ CAD import
- ✓ Surface, volume, mesh
- ✓ filling, and solidification setup
- ✓ Case run
- ✓ Practical Exercises based on tutorial

Day 2 - Results Analysis

- ✓ Computation follow-up
- ✓ Results analysis: field of results, slice, Cut-off
- ✓ Results plots
- ✓ Results export: picture, video
- ✓ ESI-Player introduction
- ✓ Practical Exercises based on case launch during Day 1
- ✓ Questions & Answers

Visit Training Schedule | myESI to register
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QuikCAST - Die Casting

Learn to use QuikCAST to create the mesh and set-up for cycling, filling, and solidification in the case of Die casting process.

BASIC

2 DAYS

Audience

New user of QuikCAST™

Prerequisites

Basic knowledge of the Die Casting process and of CAE software.

Description

The training content is composed of an alternance of theory and practical exercises and will focus on the Die casting process. Participants will learn how to prepare models, run simulations, and evaluate results via QuikCAST and its Graphical user's interface: Visual-Environment.

Training Program

Day 1 - Numerical Model Setup

- ✓ Introduction to Graphical user interface for Meshing and Set-Up
- ✓ CAD import
- ✓ Surface mesh and Grid definition
- ✓ Cycling, filling, and solidification Set-Up
- ✓ Case run
- ✓ Practical Exercises based on tutorial

Day 2 - Results Analysis

- ✓ Computation follow-up
- ✓ Results analysis: field of results, slice, Cut-off
- ✓ Results plots
- ✓ Results export: picture, video
- ✓ ESI-Player introduction
- ✓ Practical Exercises based on case launch during Day 1
- ✓ Questions & Answers

Visit Training Schedule | myESI to register
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QuikCAST - Sand Casting

Learn to use QuikCAST to create the mesh and set-up for filling, and solidification in the case of Sand-Casting process.
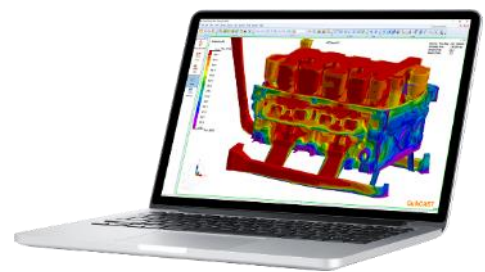
Audience

New user of QuikCAST™

Prerequisites

Basic knowledge of the investment casting process and of CAE software.

Description

The training content is composed of an alternance of theory and practical exercises and will focus on the Sand Casting process. Participants will learn how to prepare models, run simulations, and evaluate results via QuikCAST and its Graphical user's interface: Visual-Environment.

Training Program

Day 1 - Numerical Model Setup

- ✓ Introduction to Graphical user interface for Meshing and Set-Up
- ✓ CAD import
- ✓ Surface mesh and Grid definition
- ✓ filling, and solidification Set-Up
- ✓ Case run
- ✓ Practical Exercises based on tutorial

Day 2 - Results Analysis

- ✓ Computation follow-up
- ✓ Results analysis: field of results, slice, Cut-off
- ✓ Results plots
- ✓ Results export: picture, video
- ✓ ESI-Player introduction
- ✓ Practical Exercises based on case launch during Day 1
- ✓ Questions & Answers

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SYSWELD

SYSWELD Learning Path

Aerospace & Defense

Automotive

Heavy Machinery

Energy

Trainings without a marker are not industry specific.

Visual-Weld & Assembly - Automotive Spot Welding

Visual-Weld & Assembly - Automotive Seam Welding

Visual-Weld & Assembly - Truck-Ship-Aero-Heavy Seam Welding

Visual-Weld & Assembly - Solver Parameters & Contact

Visual-Weld - Material Modeling

Visual-Weld - Dissimilar Weld Integrity

Visual-Weld - Heat Treatment
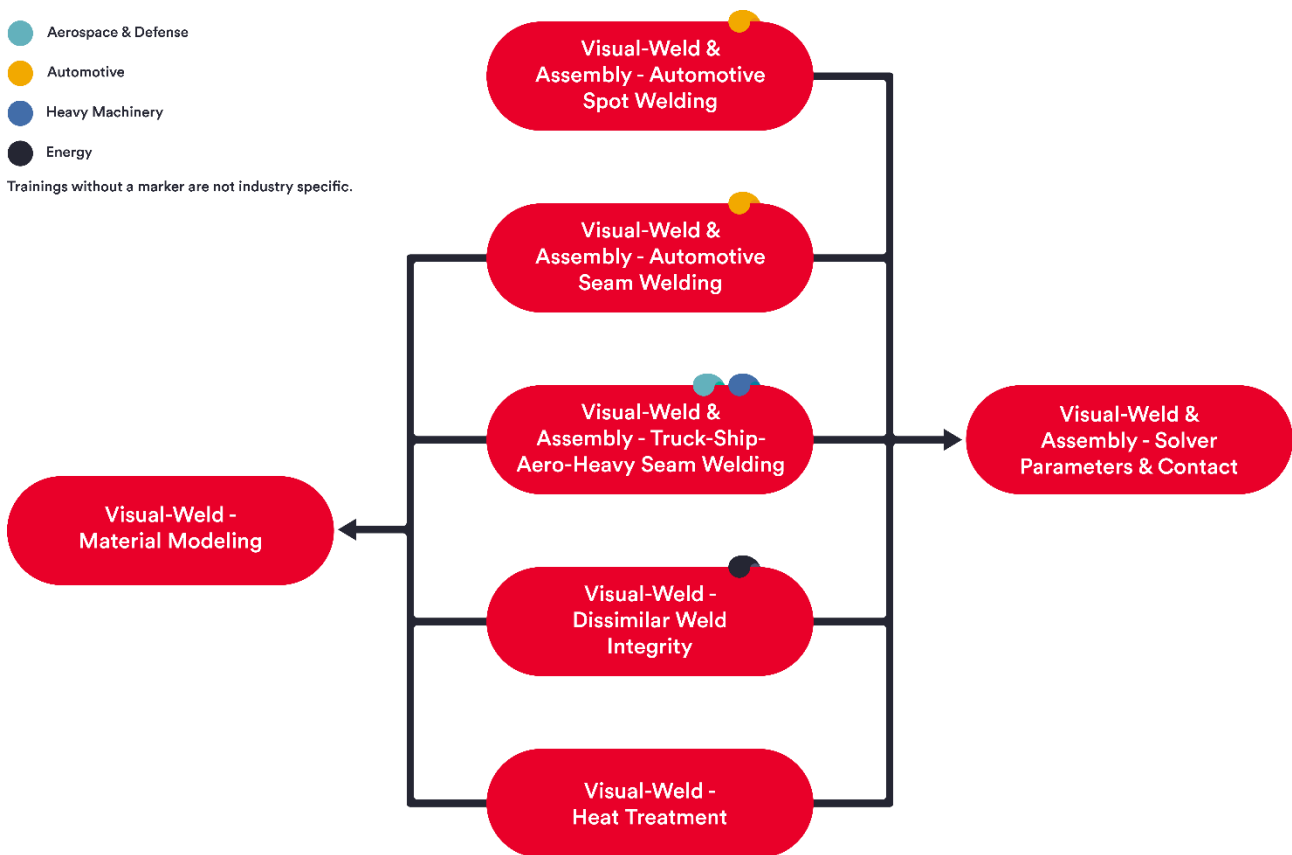
Visual-Weld & Assembly - Automotive Spot Welding

Be able to translate the welding assembly process into a virtual model that can simulate this process and its effects. Understand differences in simulation concepts to support design engineering, early manufacturing engineering, and pre-series evaluation in decision-making. Be able to manage virtually assembly, repeatability, and assembly with sub-assemblies. Work with nominal parts, part shapes as manufactured & scanned parts. Be able to go from geometry to mesh to a simulation model to assess computed results. Be able to generate models that run stable, as fast as possible, still delivering accurate results.

Audience

Manufacturing engineering from design support to process validation, pre-series validation.

Prerequisites

Basic Knowledge of CAD, CAE & Welding Assembly engineering. A video based basic training course will be provided ahead of the training.

Description

Operate the graphic user interface of Visual Environment, focus welding assembly. Generate shell mid-surface-based models of parts to be used for assembly process simulation. Understand best practices for Graphic user interface, Geometry to mesh, Material, Tools & pins, Spot welds - process definition, Clamping conditions, Contact, Solution parameters, Model check, Simulation runs, solution monitoring & file structure, Troubleshooting and Post-processing

KEYSIGHT
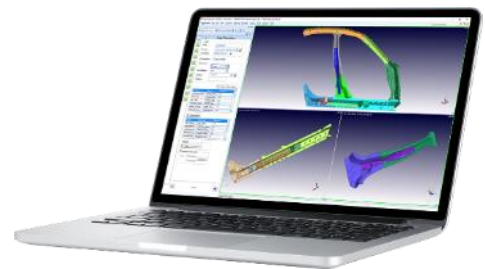
Visual-Weld & Assembly - Automotive Spot Welding (Continued)

Training Program

Day 1

- ✓ Concept of Visual Assembly, values to extract
- ✓ How to operate the Graphic User Interface & create own tailored toolbars
- ✓ How to go from a CAD model to a mid-surface mesh
- ✓ How to extract tooling surfaces from fixtures
- ✓ How to generate tools (focus meshing)
- ✓ How to generate spot-welds and connectors (focus meshing)
- ✓ How to make sure all meshes are good to go
- ✓ How to exchange nominal parts with parts as manufactured or scanned parts

Day 2

- ✓ B-Pillar application with positioning and joining
  - o Set-up and run a model
  - o Assess computed results
  - o Manage changes of design, clamping conditions, and weld sequence
  - o Manage repeatability
  - o B-Pillar application with overlap resolve for rapid distortion engineering
- ✓ Mesh density, time stepping and precision - Best performance without compromising accuracy
- ✓ How to read spot-welds and product information from an Excel file

Day 3

- ✓ ESI trunk
- ✓ Techniques to use scan data (scan to mesh)
- ✓ How to manage supplier sub-assemblies & dealing with connectors
- ✓ Industrial example

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Visual-Weld & Assembly - Automotive Seam Welding

Be able to translate the welding fabrication process into a virtual model that can simulate this process and its heat effects. Understand the benefit of combining rapid distortion engineering and welding process validation to minimize engineering & response time. Understand requirements and values delivered of rapid distortion engineering for complex designs (get a first idea and provide a quick distortion response to designs, design changes, clamps, etc.), refinement of the engineering approach with localized process simulation, and necessary steps towards accurate process validation and accurate process validation of complex designs. Be able to go from geometry to mesh to a simulation model to assessing computed results and generate models that run stable, as fast as possible, still delivering accurate results.

Audience

Manufacturing engineering from design support to process validation, pre-series validation

Prerequisites

Basic Knowledge of CAD, CAE & Welding engineering. A video based basic training course will be provided ahead of the training.

Description

- Operate the graphic user interface of Visual Environment, focus welding
- Generate shell mid-surface-based models including weld beads to be used for rapid distortion engineering and process validation
- Generate localized solid models - and if required full solid models - to refine the engineering approach
- Best practices
- A focus can be put either on rapid distortion engineering or process validation

Training Program

Day 1

- ✓ Concept of rapid distortion engineering and process validation, values to extract
- ✓ How to operate the Graphic User Interface & create own tailored toolbars
- ✓ How to go from a CAD model to a mid-surface mesh with weld beads
- ✓ How to generate 3D meshes for localized process validation models
- ✓ How to make sure meshes are good to go

Visual-Weld - Automotive Seam Welding (Continued)

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Day 2

- ✓ Rapid distortion engineering
    - o Set-up and run a model for rapid distortion engineering
    - o Assess computed results
    - o Manage changes of design, clamping conditions, and weld sequence
- ✓ Localized process validation
    - o Set-up and run a localized model for process validation
    - o Understand the contents of a material database, manage material databases
    - o Manage heat input and process windows
    - o Manage changes of material for parts and wire, clamping conditions, and weld sequence
    - o Understand the influence of process parameters, clamping conditions and material on computed results
    - o Assess computed temperature, phase transformations, distortion, and residual stresses
    - o Mesh density, time stepping and precision - Best performance without compromising accuracy
- ✓ Full model process simulation
    - o Application to a representative large and complex model

Day 3

- ✓ Continuation of localized and large model welding process validation
- ✓ Industrial example

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Visual-Weld & Assembly - Truck/Ship/Aero/Heavy Seam Welding

Be able to translate the welding fabrication process into a virtual model that can simulate this process and its heat effects and understand the benefit of combining rapid distortion engineering and welding process validation to minimize engineering & response time. Understand requirements and values delivered of rapid distortion engineering for complex designs (get a first idea and provide a quick distortion response to designs, design changes, clamps, etc.); refinement of the engineering approach with localized process simulation, and necessary steps towards accurate process validation and accurate process validation of complex designs. Be able to go from geometry to mesh to a simulation model to assessing computed results and generate models that run stable, as fast as possible, still delivering accurate results.

Audience

Manufacturing engineering from design support to process validation and pre-series validation.
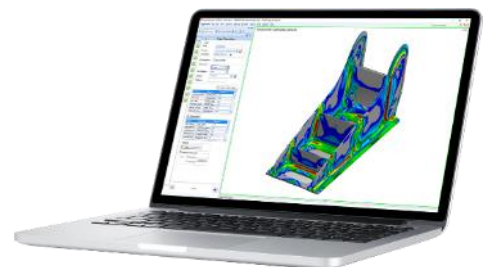
Prerequisites

Basic Knowledge of CAD, CAE & Welding engineering. A video-based basic training course will be provided ahead of the training.

Description

- Operate the graphic user interface of Visual Environment, focus welding
- Generate shell mid-surface-based models including weld beads to be used for rapid distortion engineering and process validation
- Generate localized solid models, single and multi-pass, to refine the engineering approach
- Bull-dozer frame example with 100+ welds
- Best practices:
- A focus can be put either on rapid distortion engineering or process validation

Training Program

Day 1

- ✓ Concept of rapid distortion engineering and process validation, values to extract
- ✓ How to operate the Graphic User Interface & create own tailored toolbars
- ✓ How to go from a CAD model to a mid-surface mesh with weld beads
- ✓ How to generate 3D meshes for localized process validation models
- ✓ How to make sure meshes are good to go

Visual-Weld & Assembly - Truck/Ship/Aero/Heavy Seam Welding (Continued)

Day 2

- ✓ Rapid distortion engineering
    - o Set-up and run a model for rapid distortion engineering
    - o Assess computed results
    - o How to manage changes of design, clamping conditions, and weld sequence
- ✓ Localized process validation
    - o Set-up and run a localized model for welding process validation
    - o Understand the contents of a material database, manage material databases
    - o Manage heat input and process windows
    - o Manage changes of material for parts and wire, clamping conditions, and weld sequence
    - o Understand the influence of process parameters, clamping conditions and material on computed results
    - o Assess computed temperature, phase transformations, distortion, and residual stresses
    - o Mesh density, time stepping and precision - Best performance without compromising accuracy
- ✓ Full model process simulation
    - o Application to a representative large and complex model

Day 3

- ✓ Continuation of localized and large model welding process validation
- ✓ Industrial example

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Visual-Weld - Dissimilar Weld Integrity

Be able to translate the entire fabrication process into a virtual model that can simulate this process and its heat effects; model a complex fabrication process that includes cladding, heat treatment, welding, post-weld heat treatment, and machining; go from geometry to mesh to a simulation model to assessing computed results and assess computed temperature, phase transformations, distortion, and residual stresses. Be able to generate models that run stable, as fast as possible, still delivering accurate results and understand and apply specific modeling techniques (fast transient & instantaneous welding) to assess large 3D structures)

Audience

Engineers concerned with distortion and weld repair of thick multi-pass dissimilar welds

Prerequisites

Basic Knowledge of CAD, CAE, process, and material knowledge of dissimilar welds.

Description

- Operate the graphic user interface of Visual Environment, focus welding
- Generate a multi-pass simulation model
- 2D and 3D examples
- Best practices for graphic user interface, Geometry to mesh, Material, Shrinkage effects, Heat sources / heat input - process definition, Clamping conditions, Contact, Solution parameters, Model check, Simulation runs, simulation monitoring, file structure, Troubleshooting and Post-processing

KEYSIGHT

Visual-Weld - Dissimilar Weld Integrity (Continued)

Training Program

Day 1

- ✓ Concept of virtual dissimilar weld fabrication
- ✓ How to operate the Graphic User Interface & create own tailored toolbars
- ✓ How to go from a CAD model or a drawing to a 2D solid mesh with weld beads
- ✓ How to generate 3D solid meshes
- ✓ How to make sure meshes are good to go

Day 2

- ✓ 2D axial symmetric example - full process simulation
- ✓ Understand the contents of a material database, manage material databases
- ✓ Modelling of heat input, understanding process windows
- ✓ Understand the influence of process parameters and material on computed results
- ✓ Assess computed temperature, phase transformations, distortion, and residual stresses
- ✓ Manage changes of material for parts and wire, clamping conditions, and weld sequence
- ✓ Mesh density, time stepping and precision - Best performance without compromising accuracy

Day 3

- ✓ Expansion to 3D

Visual-Weld - Heat Treatment

Be able to translate the heat treatment process into a virtual model that can simulate this process and its heat effects; simulate heating, carburization if required, quenching and tempering; assess computed temperature, phase transformations, distortion, and residual stresses; go from geometry to mesh to a simulation model to assessing computed results and generate models that run stable, as fast as possible, still delivering accurate results

Audience

Engineers concerned with heat treatment of metal part

Prerequisites

Basic Knowledge of CAD, CAE, and heat treatment engineering.

Description

Operate the graphic user interface of Visual Environment, focus heat treatment. Generate 2D solid and 3D solid heat treatment models. Best practices for Graphic user interface; Geometry to mesh; Material; Process definition; Quenching media; Solution parameters; Model check; Simulation runs, simulation monitoring, file structure; Troubleshooting and Post-processing
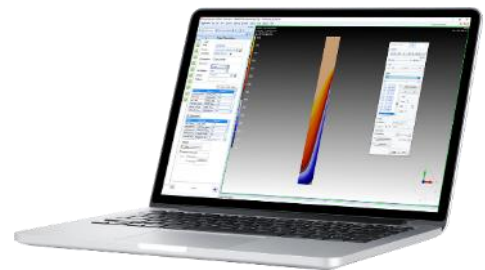
Training Program

Day 1

- ✓ How to operate the Graphic User Interface & create own tailored toolbars
- ✓ How to go from a CAD model to a 2D solid mesh
- ✓ How to go from a CAD model to a 3D solid mesh
- ✓ How to make sure meshes are good to go

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KEYSIGHT

Visual-Weld - Heat Treatment (Continued)

Day 2

- ✓ Jominy end quench test
  - o Set up and run the jominy end quench test
  - o Understand the contents of a material database, manage material databases
  - o Understand how to modify public databases to own needs (basics)
  - o Manage quenching media and process windows
  - o Understand the influence of process parameters, and material on computed results
  - o Assess computed temperature, phase transformations, distortion, and residual stresses
  - o Assess hardness and compare with measurements
  - o Modify the CCT diagram to match computed with measured hardness
  - o Use own material and quenching media
  - o Investigate into layered meshing density and computed results corresponding to own cases
  - o Mesh density, time stepping and precision - Best performance without compromising accuracy
- ✓ Jominy specimen - heating & diving
  - o Use the jominy specimen to simulate heating and diving into a quenching media
- ✓ Jominy specimen - carburization and quenching
  - o Use the jominy specimen to simulate heating, carburization, and quenching
- ✓ Full model process simulation
  - o Application to a representative large and complex model

Day 3

- ✓ Continuation large model process validation
- ✓ Industrial example

Visual-Weld & Assembly - Solver Parameters & Contacts

Understand contact modelling and how and when to use contact efficiently for rapid distortion and welding validation analysis. Understand solver parameters and its impact on performance and accuracy. Understand how to identify unhealthy simulations and how to get over it. Understand file structures and solution monitoring.

Audience

Manufacturing engineering from design support to process validation.
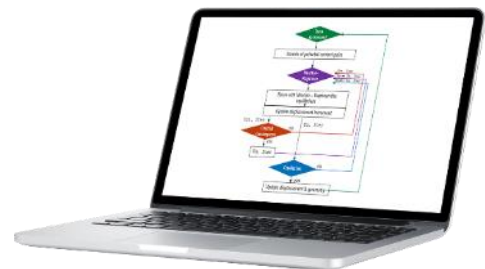
Prerequisites

Completion of any basic training featuring Visual-Weld and Visual-Assembly.

Description

This course focuses on advanced Visual-Weld & Assembly solution usability (contact modeling & solver parameters). You will learn how to improve the accuracy, robustuness, and stability of your simulations for industrial applications.

Training Program

Day 1

- ✓ Contact
  - o Iterative process
  - o Available contact methods
  - o Contact definition
  - o How to manage contact penetrations
  - o How to read contact definitions in an input deck
- ✓ Solver parameters
  - o Algorithms
  - o Precision
  - o Automatic time step control
  - o Solver resolution settings
  - o Advanced parameters
- ✓ Nonlinear geometry
  - o What is it and when to use
- ✓ Troubleshooting
- ✓ Model checking
  - o Model definitions that help reaching convergence

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KEYSIGHT

Visual-Weld - Material Modeling

Understand material phenomena important for the modelling of the heat effects of welding & heat treatment. Understand which material properties are important to model heat effects of welding & heat treatment. Understand how to model material so that it can be used in a welding of heat treatment simulation. Understand how to generate own material databases starting from a public database

Audience

Manufacturing engineering from design support to process validation.
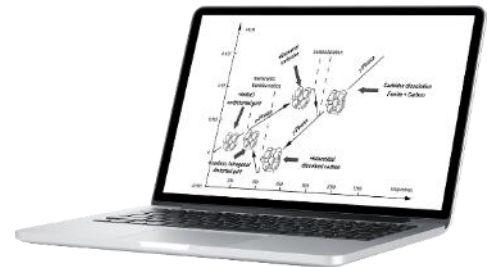
Prerequisites

Completion of any basic training featuring Visual-Weld or Visual Heat Treatment.

Description

This course focuses on advanced Visual-Weld & Heat Treatment solution usability. You will learn how to improve the fidelity of your simulation by improving your knowledge on material modeling, i.e. material phenomna, material properties, etc.

Training Program

Day 1

- ✓ Material phenomena in Welding & Heat Treatment
    - o Low alloyed carbon steel
    - o High alloyed steel / special metals
    - o 5000 / 6000 series aluminum alloys
    - o Ti-6Al-4V
- ✓ Modelling of Phase Transformations for Welding & Heat Treatment
    - o Material models and parameters to calibrate
    - o How to display ITT and CCT diagrams in Visual Environment
    - o Diffusion-controlled iso-thermal transformation
    - o Diffusion-controlled continuous cooling transformation
    - o Martensite transformation
    - o Tempering of Martensite transformation
    - o Transformation of not yet deposited material
- ✓ Thermal and mechanical modelling of the heat effects of welding and heat treatment including phase transformations
    - o Thermo-physical properties
    - o Mechanical properties
    - o Strain- and plasticity modelling
- ✓ S355 / A572 databases and variants

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for training courses and select available dates.

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PAM-COMPOSITES

PAM-COMPOSITES Learning Path

- ● Aerospace & Defense
- ● Automotive
- ● Heavy Machinery
- ● Energy

Trainings without a marker are not industry specific.

PAM-FORM - Composites Basic Training	PAM-RTM - Basic Training	PAM-DISTORTION - Basic Training
PAM-FORM - Plastics and Trims Basic Training	PAM-RTM Iso-Thermal Filling Training	PAM SMC Basic Training

Visit Training Schedule | myESI to register
for training courses and select available dates.

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PAM-FORM - Composites Basic Training

Understand material models for dry textiles or prepregs. Be able to model, analyze results and optimize through simulation standard forming / thermoforming processes. Be able to identify required data and determine proper assumptions for simulations.

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing manufacturing processes such as thermoforming of prepreg or draping of dry textiles. This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.
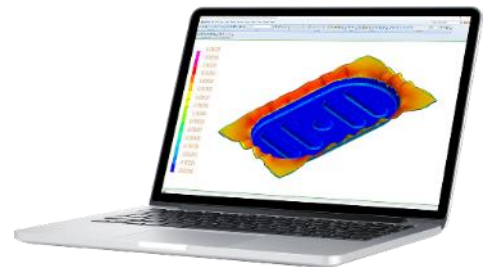
Training Program

Day 1 - Physics and GUI Description

- ✓ Introduction on physics, modeling, material requirements
- ✓ Elementary test simulation
- ✓ Explanation of required input parameters: Material characterization tests
- ✓ Single layer forming simulation.
- ✓ Multi-layer forming simulation.
- ✓ Post-processing and presentation of results

Day 2 - Practical Exercises

- ✓ Exercises (selection of these will be used in the training):
  - o Multi-stage simulation (gravity, forming)
  - o Diaphragm simulations.
  - o Flattening tool: Initial flat pattern optimization
  - o Thermoforming simulation of organosheets
  - o Doubts and requests
  - o Trim Press Forming
  - o Plastic Blow Forming

KEYSIGHT

PAM-FORM - Plastics and Trims Basic Training

Be able to model, analyze results and optimize through simulation:
Standard injection or infusion processes considering thermal effects including preheating and curing processes Be able to identify required data and to determine proper assumptions for simulations.

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing thermoforming processes of auto interior parts (instrument panels, acoustic liners…) or packages. This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.
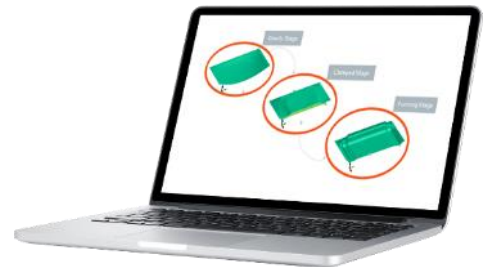
Training Program

Day 1 - Physics and GUI Description

- ✓ Introduction on physics, modeling, material requirements
- ✓ Elementary test simulation
- ✓ Explanation of required input parameters: Material characterization tests
- ✓ Single layer forming simulation.
- ✓ Multi-layer forming simulation.
- ✓ Post-processing and presentation of results

Day 2 - Practical Exercises

- ✓ Multi-stage simulation (gravity, forming)
- ✓ Trim Press Forming
- ✓ Plastic Blister Forming.
- ✓ Flattening tool: Initial flat pattern optimization
- ✓ Doubts and requests

PAM-RTM - Basic Training

Be able to model, analyze results and optimize through simulation - Standard injection or infusion processes considering thermal effects including preheating and curing processes. Be able to identify required data and to determine proper assumptions for simulations

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing manufacturing processes such as RTM/infusion for composite parts. This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.

Training Program

Day 1 - Physics and GUI Description

- ✓ Introduction on physics, modeling, material requirements
- ✓ GUI description and workflow Visual-RTM and Visual-Viewer
- ✓ Shell model simulations: From CAD (1) to simulation with simple tutorials.:
    - o Vents, air traps, gravity effect.
    - o Permeability and fiber orientation definition.
    - o Layer design manager.
    - o Channels and runners.
    - o Automatic process: Triggers and sensors.

Day 2 - Isothermal Analysis

- ✓ Shell model for injection simulation: Options of filling simulation
- ✓ Air entrapment, gravity
- ✓ Solid model simulations
- ✓ From CAD (1) to simulation with advanced tutorials.
    - o CPD and lay-up importation.
    - o Mesh of a complex laminates. Automatic mesh.
    - o Coupled thermal and curing simulations: Preheating, Heated RTM and Curing

Day 3 - Draping effect, Non-Isothermal and Fluid-Mechanic analysis

- ✓ Solid model simulation with thermal analysis
- ✓ Coupled thermal and curing simulations: Mold preheating, Heated RTM and Curing
- ✓ Effect of draping on injection (Importation of fiber direction and laminates):
- ✓ Link with QUIKFORM on shell and solid model
- ✓ Link with PAM-FORM on shell and solid model
- ✓ Extra options: Flow optimization, porosity, overfilling and gravity
- ✓ Fluid-mechanic simulations: Infusion, Core deformation, Light-RTM and CRTM

(1) This training course includes initiation to Visual-Mesh regarding the specific meshing needs of the treated models. However, it does not include a complete Visual-Mesh training that can be ordered separately.

KEYSIGHT

PAM-DISTORTION - Basic Training

Be able to model, analyze results and optimize through simulation residual stresses and resulting geometrical distortions. Be able to identify required data and to determine proper assumptions for simulations.

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing curing processes of composite parts. This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.
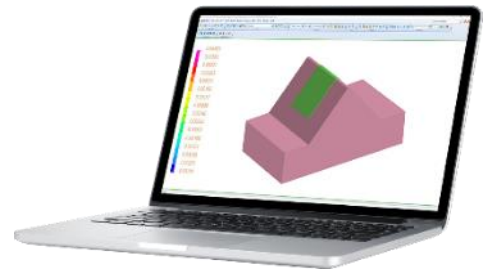
Training Program

Day 1 – Physics, GUI Description and Curing Simulations

- ✓ Introduction on physics, modeling, material requirements for the curing simulation
- ✓ Workflow and GUI description.
- ✓ Curing simulation on basic part geometry
- ✓ From CAD (1) to simulation: Modeling, laminate creation, element orientation and boundary conditions

Day 2 – Basic Exercises

- ✓ Virtual testing for Lamina and laminate material characterization
- ✓ Distortion simulation on L-Shape geometry
- ✓ Single stage simulation: Free distortion during curing
- ✓ Multi-stage simulation: Distortion during and after curing (without mold)
- ✓ Curing simulation on L-Shape geometry with mold: Thermal interaction with mold
- ✓ Distortion simulation on L-Shape geometry with mold: Mechanical interaction with mold

Day 3 – Advanced Exercises

- ✓ Gravity effect
- ✓ Post-cured cycles
- ✓ Trimming stage
- ✓ Co-cured or assembled with adhesive.

(1) This training course includes initiation to Visual-Mesh regarding the specific meshing needs of the treated models. However, it does not include a complete Visual-Mesh training that can be ordered separately.

PAM-RTM Iso-thermal Filling

Be able to model, analyze results and optimize through simulation standard injection or infusion processes performed at a constant and uniform temperature. Be able to identify required data and to determine proper assumptions for simulations.

BASIC

2 DAYS

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing manufacturing processes such as RTM/infusion for composite parts. This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.
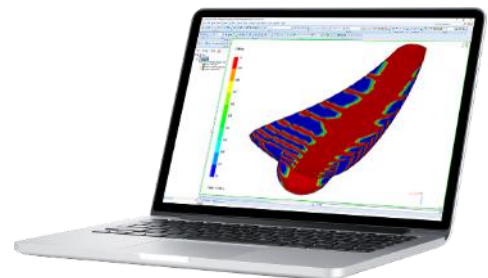
Training Program

Day 1

- ✓ Introduction on physics, modeling, material requirements.
- ✓ GUI description and workflow Visual-RTM and Visual-Viewer.
- ✓ Shell model simulations: From CAD (1) to simulation with simple tutorials. The next concepts will be explained:
  - o Vents, air traps and gravity effect.
  - o Permeability and fiber orientation definition.
  - o Layer design manager.
  - o Channels and runners.
  - o Automatic process: Triggers and sensors.
  - o Air entrapment, gravity.

Day 2

- ✓ Solid model simulations.

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- ✓ From CAD (1) to simulation with advanced tutorials. The next concepts will be explained:
    - o CPD and lay-up importation.
    - o Mesh of a complex laminates. Automatic mesh.
- ✓ Effect of draping on injection (Importation of fiber direction and laminates):
    - o Link with QUIKFORM on shell and solid model.
    - o Link with PAM-FORM on shell and solid model.
- ✓ Extra options: Flow optimization, porosity, overfilling and gravity.
- ✓ Fluid-mechanic simulations: Infusion, Core deformation, Light-RTM and CRTM.
- ✓ Design of Experiments and Optimization.

(1) This training course includes initiation to Visual-Mesh regarding the specific meshing needs of the treated models. However, it does not include a complete Visual-Mesh training that can be ordered separately.

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PAM-SMC Basic Training

Be able to simulate the whole SMC process and analyze and optimize the simulated results. This training will teach you to perform the preforming of initial charges and compression of them to optimize the initial position and initial thickness of the and predict some weld lines, fiber orientation, press force, temperature distribution and other variables related to SMC process to easily tune the process parameters.

Audience

CAE engineers, Process engineers, Material engineers, Designers

Prerequisites

Basic FEA knowledge and basic composites material knowledge

Description

This training is meant for engineers responsible for designing SMC manufacturing process and/or product engineers that want to study the impact of the manufacturing process in the product performance.
This training relies on PowerPoint presentation and practical use cases executed on workstation. This training will allow the trainee to confidently create simulation models.
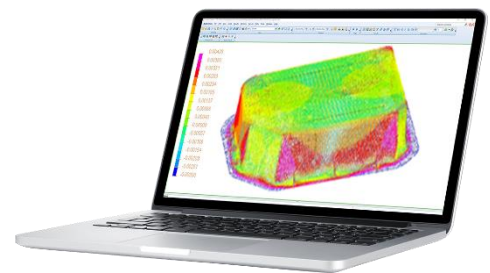
Training Program

Day 1

✓ Overview of PAM-SMC:
  o Introduction
  o SMC Physics and Modeling
  o Environment/GUI
  o Workflow
  o Additional functionalities for Visual-SMC
✓ Tutorials to explain the next topics:
  o Preforming
  o Forming Squeezing
  o Multicharge
  o Local thickness
  o Weld Lines
  o Heated Compression

Automation

Automation in Visual Environment

Automation in Visual Environment Learning Path
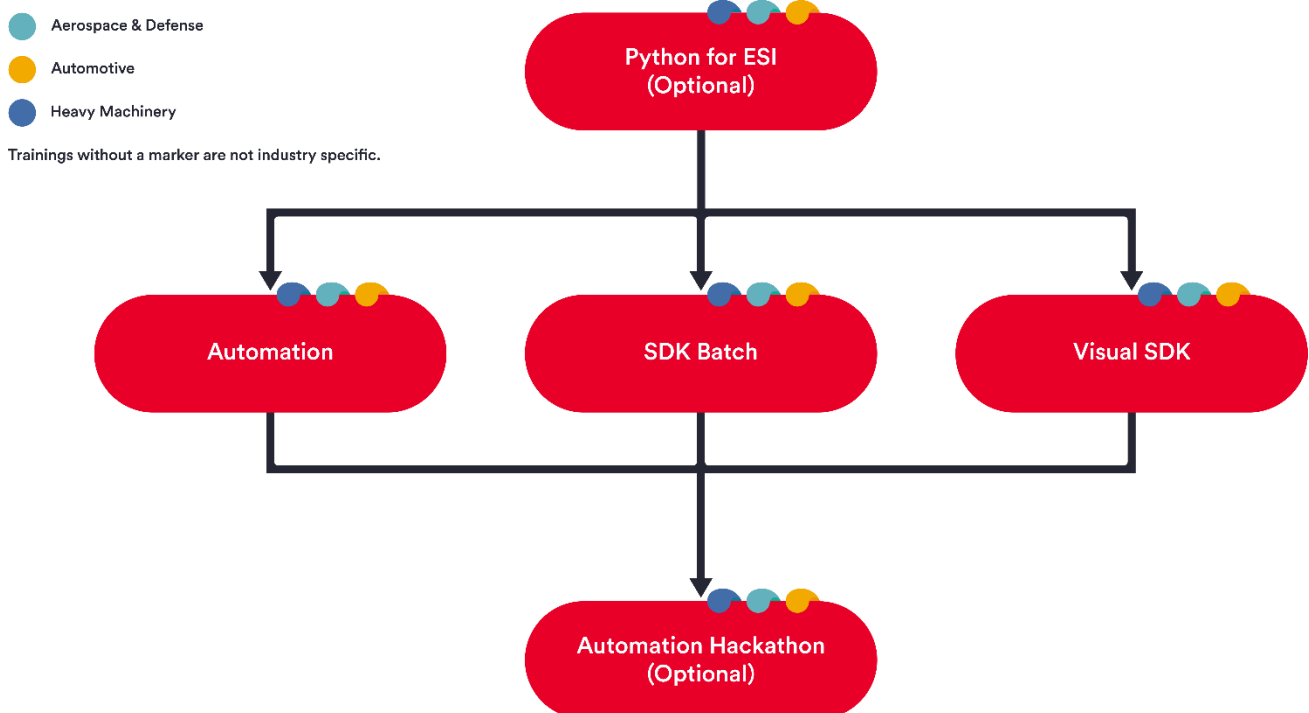
List of Solutions supported by Automation:

- Casting
- Composites
- VPS Crash, Impact, Safety
- Fluid Dynamics
- NVH & Dynamics
- Sheet Metal Forming
- Virtual Integration Platform
- Welding
- Assembly

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Python Basics

Apply python programming scripts unique to ESI software to enable automation and optimization of CAE Workflows. Utilize Python Libraries in both preprocessing, solving and postprocessing.

Audience

CAE Engineers willing to automate tasks and speed-up processes.

Prerequisites

Basic understanding of any VE context.

Description

Designed and curated for CAE professionals and enthusiasts alike, this course equips you with a solid foundation in standard Python concepts and libraries essential for VE integration. Participants will explore the rich ecosystem of Python libraries seamlessly integrated within VE from meshing and preprocessing to solving and post-processing, these libraries provide powerful tools for automating and optimizing CAE workflows.

Training Program

Day 1

Introduction to Python
- ✓ Introduction to Python
- ✓ Basic Syntax
- ✓ Control flow
- ✓ Functions
- ✓ Classes and Object-Oriented Programming
- ✓ Modules
- ✓ File I/O
- ✓ Command line arguments

Python for Visual-Environment
- ✓ Version, compatibility, and installation
- ✓ Libraries
  - o Introduction to various libraries in VE
  - o VistaDb library
  - o Viewer library
- ✓ General syntax in VE API codes
- ✓ API Help

KEYSIGHT

Automation Using Scripting in Visual-Environment

Develop efficient automation solutions to apply to your current challenges faced in your CAE workflows. Understand and apply the versatility and flexibility of Python scripting in Visual environment.

BASIC 1 DAY

Audience

Tailored for CAE analysts aiming to establish dependable, replicable, and resilient simulation methodologies within VE through automation.

Prerequisites

Familiarity with Python programming language and basic understanding of any VE context usage.

Description

In the rapidly evolving field of CAE, automation has emerged as a crucial component for enhancing productivity and efficiency. Designed for CAE analysts, this course dives deep into the automation capabilities of VE. Participants will gain hands-on experience in harnessing the power of Python scripting to automate a wide range of tasks within VE. From meshing and pre-processing to solving and post-processing, this course equips participants with the skills needed to develop efficient and customized automation solutions tailored to their specific CAE workflows. Through practical exercises and real-world examples, participants will explore the versatility and flexibility of Python scripting in VE, enabling them to unlock new levels of productivity and effectiveness in their CAE projects. Furthermore, customization capabilities extend to menu and toolbar creation, along with command-line argument integration, enhancing overall usability. This feature-rich environment enables participants to seamlessly integrate automation scripts into their workflow, promoting efficiency and ease of use across diverse CAE tasks.

Training Program

Day 1

- ✓ Introduction to Automation in VE
- ✓ VE Scripts
    - o Introduction
    - o Menu GUI architecture
    - o Log files
- ✓ Scripting in VE
    - o Python binding in VE
    - o Session code analysis
    - o Libraries
- ✓ Macros
    - o Introduction to Macros
    - o Creation of Macros

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- o   Parametrization using Macros
- ✓   Customization
  - o   Preferences setting
  - o   Create Custom Menus and Toolbars
  - o   Tag scripts to Menu and Execute

- ✓   Command Line Arguments
  - o   Arguments in VE

KEYSIGHT

Automation using SDK-Batch

Learn how to leverage its command-line interface alongside the Python module VistaDb for streamlined task execution, optimizing efficiency in your workflows.

Audience

Tailored for CAE analysts seeking to streamline automated task execution through command line interface**.**

Prerequisites

Familiarity with Python programming language and basic understanding of any VE context usage**.**

Description

This course empowers you to construct Python packages compatible with ESI's proprietary batch script executor, SDK Batch. Utilizing the bundled python packages and VistaDb library, users can develop lightweight, easy to develop and efficient business logics for various tasks, including meshing, model building, and post-processing. During the course you get access to more than 2000 commands that makes your automation journey simple and your CAE processes effective. Additionally, you also gain comprehensive knowledge on package creation and execution within this versatile batch tool.

Training Program

Day 1

- ✓ Introduction to basic Automation in VE
- ✓ Introduction to SDK Batch
    - o Python binding
    - o Execution of scripts
- ✓ VistaDb Library
    - o Introduction to the library
    - o General syntax
    - o Mesh creation
    - o Model data query
    - o Result data query
- ✓ Packages
    - o Create package for command line interface
    - o Install and execute packages in SDK - Batch
- ✓ API Help
- ✓ Other Batch interfaces in VE

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- VE Batch
- VisualEnv Batch

KEYSIGHT

Workflow Automation in VE (Visual-SDK)

Gain expertise in scripting techniques to streamline workflows, implement parametric session executions, and craft efficient automation codes. Learn to develop customized GUIs with user friendly Visual SDK interface.

ADVANCED   2 DAYS

Audience

Tailored for CAE analysts aiming to establish dependable, replicable, and resilient simulation methodologies within VE through automation.

Prerequisites

Familiarity with Python programming language, basic understanding of any VE context usage and basic task automation techniques in VE.

Description

Workflows are intricate sets of tasks that demand systematic and logical execution. Learn how to create systematically organized task blocks and sequences to streamline processes, from meshing and model preparation to post-processing and report generation. Leveraging the VSDK framework, you'll discover how to develop custom GUIs, deploy, and execute these workflows seamlessly. Through this course, participants will discover the power of automation in optimizing CAE workflows, unlocking new levels of efficiency and productivity in their engineering endeavors.
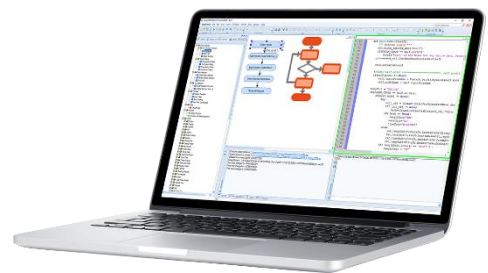
Training Program

Day 1

- ✓ Introduction to Automation in VE
- ✓ Visual SDK (Software Development Kit)
    - o Introduction to Visual Integration Platform
    - o SDK Framework
- ✓ Create Workflows
    - o Introduction to Define Process skin
    - o Blocks and Connectors
    - o Files related to workflows
    - o Modules and Classes
    - o Code Snippets and utility codes
- ✓ Workflow Execution
    - o Introduction to Process Executive skin
    - o Modes of Workflow Execution
    - o Wizard Mode Workflows

Day 2

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- ✓ Interfaces
  - o Introduction to Custom UI
  - o Introduction to VE - Batch
- ✓ Custom Graphical User Interface (GUI)
  - o Python binding in Custom GUI
  - o Files in Custom GUI creation
  - o Introduction to available controls
  - o Call backs
  - o GUI creation wizard
- ✓ Execution
  - o Modes of Custom GUI execution
  - o Standard vs Wizard GUIs.
  - o Custom menu options
- ✓ Advanced Controls
  - o File and Directory Browsing
  - o Selection Control
- ✓ Packages
  - o Create Workflow as package
  - o Deploy package
- ✓ Site folder customization

Automation Hackathon

Gain expertise in scripting techniques to streamline workflows, implement session executions, and craft efficient automation codes. Enhance your CAE engineering productivity and unleash Visual-Environment's (VE) full potential with our comprehensive training

Audience

Tailored for CAE analysts seeking to streamline their workflow and solve specific challenges using automation within Visual Environment (VE)**.**

Prerequisites

Familiarity with Python programming language and basic understanding of any VE context usage**.**

Description

Automation Hackathon course, where CAE analysts delve into the world of automation within Visual Environment (VE) to solve real-world challenges. The problem solved during the course will come from the participants. Once the problem statements are defined, participants will dive into the hands-on aspect of the course. Guided by experienced instructors, teams will leverage VE's automation capabilities to develop creative solutions to the presented challenges. The challenge can be from meshing, model building or post processing which participants like to solve, participants will have the opportunity to tackle a wide range of tasks using Python scripting and VE's customizable features. By the end of the course, participants will have gained valuable experience in automation within VE, as well as enhanced problem-solving and understanding of automation framework. They'll leave with a deeper understanding of how automation can revolutionize their CAE workflows and drive efficiency and innovation in their organizations.
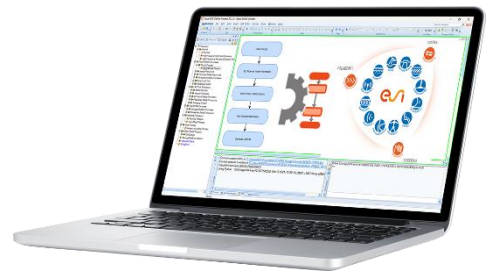
Training Program

Day 1

- ✓ Introduction to Automation in VE
- ✓ Scripting in VE
    - o Python binding in VE
    - o Session code analysis
    - o Libraries
- ✓ Customization
    - o Create Custom Menus and Toolbars
    - o Tag scripts to Menu and Execute

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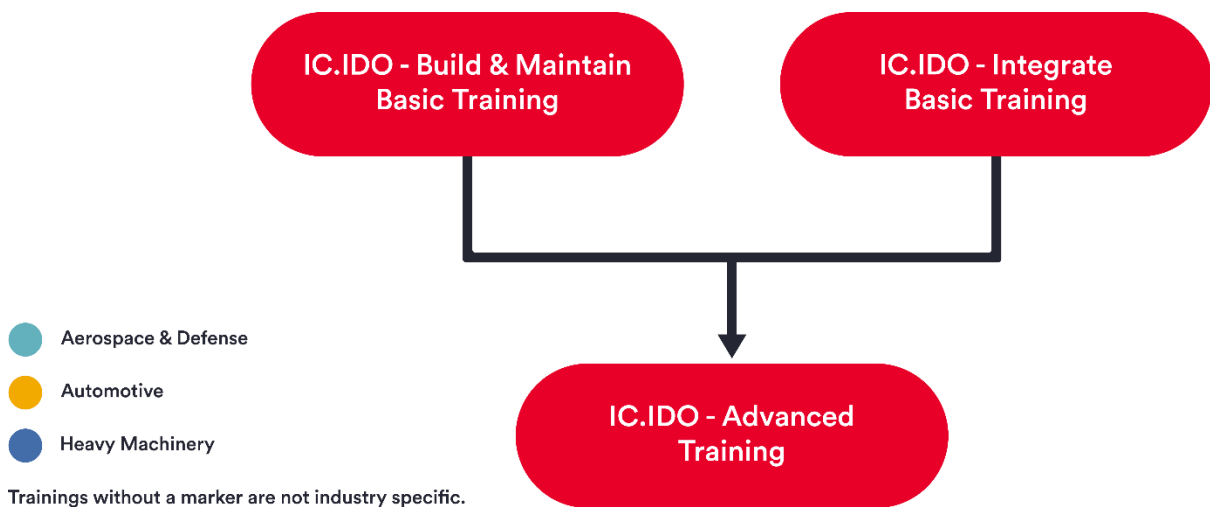for training courses and select available dates.

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✓ Hands on
   o Instructor guides the audience to solve the chosen problem step by step

Human Centric

IC.IDO

IC.IDO Learning Path

IC.IDO - Build & Maintain Basic Training

IC.IDO - Integrate Basic Training

IC.IDO - Advanced Training

● Aerospace & Defense

● Automotive

● Heavy Machinery

Trainings without a marker are not industry specific.

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IC.IDO - Integrate Basic Training

Learn how to use digital product design data and create a collaborative virtual mock-up environment to visualize, understand, and validate product packaging or integration concerns during the product development phase.

Audience

Product Integration, Assembly and Maintenance Process Engineering, Tooling Engineering, etc.

Prerequisites

Basic knowledge of CAD systems

Description

This course is an introduction to IC.IDO. It will educate participants on how to create workflows that can be used to conduct product integration validations.

Training Program

Day 1

- ✓ Introduction
- ✓ Software fundamentals
- ✓ Prepare first IC.IDO session
- ✓ Static & dynamic space claim validation studies

Day 2

- ✓ Dynamic validation of mechanically jointed assemblies
- ✓ Dynamic wire harness simulation to validate optimized layout and routing
- ✓ Dynamic validation of installation & removal paths of components and subassemblies

Day 3

- ✓ Virtual exploration using immersive environment
- ✓ Training project with user defined use case

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IC.IDO - Build & Maintain Basic Training

Learn how to create a collaborative virtual mock-up environment to visualize, experience, and validate integrated digital product designs during the engineering of human-centric assembly and service processes.

Audience

Product Integration, Assembly and Maintenance Process Engineering, Tooling Engineering, etc.

Prerequisites

Basic knowledge of CAD systems

Description

This course is an introduction to IC.IDO. It will educate participants on how to create workflows that can be used to conduct product integration as well as virtual build & maintenance validations.

Training Program

Day 1

✓ Introduction
✓ Software fundamentals
✓ Prepare first IC.IDO session
✓ Static & dynamic space claim validation studies

Day 2

✓ Dynamic validation of mechanically jointed assemblies
✓ Dynamic wire harness simulation to validate optimized layout and routing
✓ Dynamic validation of installation & removal paths of components and subassemblies
✓ Worker ergonomics evaluations

Day 3

✓ Process sequence & methods verification
✓ Virtual exploration using immersive environment
✓ Training project with user defined use case

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KEYSIGHT

IC.IDO - Advanced Training

Learn about advanced workflows and features that can be used to conduct intricate product integration and virtual build & maintenance validations.

Audience

Product Integration, Assembly and Maintenance Process Engineering, Tooling Engineering, etc.

Prerequisites

Completion of IC.IDO Basic Training (Build & Maintain or Integrate)

Description

This course is an advanced course of IC.IDO that will educate participants on advanced workflows and features that can be used to conduct intricate product integration and virtual build & maintenance validations.

Training Program

Day 1

- ✓ IC.IDO tips & tricks
- ✓ Body tracking capabilities for ergonomic evaluation*
- ✓ How to use cooperate to conduct multi-site reviews

* Build & Maintain Requirement*

Day 2

- ✓ Finger tracking capabilities for hand clearance validation
- ✓ Workcell and line validation
- ✓ Handheld power tool clearance studies using object tracking
- ✓ IC.IDO troubleshooting techniques

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Other Resources

Thank you for taking the time to consider training from ESI; we trust you found this catalog useful. We want to ensure you're also aware of these other resources available to you:

myesi.esi-group.com: This is your customer portal provided by ESI Group, where you can access exclusive resources, product updates, support, and even interact with other users for community support and information sharing.

www.esi-group.com: This is the official website of ESI Group where you'll find comprehensive information about the company, its services, and products. It is a central hub for news, event information, and updates about the company.

ESI social media platforms: ESI Group's social media accounts on platforms including LinkedIn, Twitter, Facebook, and YouTube provide real-time updates, news, and insights about the company and its offerings.

Events and webinar pages: On these pages, you'll find information about upcoming webinars, online events such as ESI Live, and physical conferences hosted or participated in by ESI Group.

ESI News: This section on ESI Group's website features the latest news and announcements from the company. Watch this space...

The ESI Blog: Our blog is a valuable resource that provides expert insights, thought leadership, and detailed articles on a wide range of topics related to ESI Group's products and services.

The Resource Center: ESI's resource center is the library of resources such as whitepapers, case studies, e-books, and tutorials related to the company's products and services.

Customer Stories: The "Customer Stories" section features real-life experiences of customers using ESI Group's products and solutions. and can be a great source of inspiration and learning for both prospective and existing customers.

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