



DIGITAL SOLUTIONS

# TRAINING CATALOGUE

QRA and CFD simulation

Phast, Safeti and KFX

### Global training

Our increased focus on global training, including basic and advanced user courses, and the high level of expertise of our team of instructors, benefit users in all regions. Our training catalogue lists our many and varied technical courses and workshops spread across all brands. In addition we run customer specific courses. Many of these courses are held jointly by our own software support team and by engineers from DNV GL, who bring essential expertise domain

### Want to know more

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## PHAST TRAINING

**Course code: SA-01**  
**Duration: 3 days**

**Prerequisite:**

The course is suitable for new users and for more experienced users who have not attended a formal training course or would like a refresher course. A basic understanding of hazard analysis and the concept of consequence modelling is required, as is some experience of the process industry.

**Description**

The course introduces the concepts and models within Phast. It will cover all areas of consequence modelling within the software, including discharge, dispersion, pool formation and evaporation, fires, explosions and toxic effects. You will be required to practice and apply your new knowledge of the software through extensive hands-on workshops.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the theoretical and practical aspects of Phast. You will be able to create a range of scenarios from scratch, modelling the effects of releases of hazardous material from initial discharge through dispersion to final flammable and toxic effects. You will also be able to review and understand results and view these in tabular and graphical form and on maps in order to assess the effects of hazardous events and mitigate their consequences.

**Target group**

Users who need to carry out consequence modelling calculations in the process industries including safety analysts, operators, process design engineers, regulators and legislators, insurance companies, engineering contractors and consultants, or users who need to understand the output of a consequence analysis performed with Phast.



## SAFETI TRAINING

**Course code: SA-02**

**Duration: 5 days**

**Prerequisite:**

The course is suitable for new users and for more experienced users who have not attended a formal training course or would like a refresher course. A basic understanding of hazard analysis and the concept of consequence modelling and QRA is required, as is some experience of the process industry.

**Description**

The course introduces the concepts and models within Safeti. It will cover all areas of consequence modelling within the software, including discharge, dispersion, pool formation and evaporation, fires, explosions and toxic effects.

The course will also cover all areas of risk modelling within the software, including assessment of the impact of hazardous releases on the human population, taking account of probabilistic meteorological data (wind-roses), event frequencies, ignition probabilities, and location of population areas. You will be required to practice and apply your new knowledge of the software through extensive hands-on workshops.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the theoretical and practical aspects of Safeti. Starting from the release case scenario models, you will use them to develop a simple QRA (Quantitative Risk Analysis) example. You will learn to use the extended functionality provided by Safeti, including population and ignition source definition on a map. The course also covers the additional reporting capabilities provided in Safeti, such as risk contours, F/N curves and risk ranking reports.

**Target group**

Users who need to carry out QRA calculations in the process industries, including regulators and legislators, insurance companies, engineering contractors and consultants, or users who need to understand the output of a QRA model built in Safeti.



## PHAST ADVANCED MODELLING

**Course code:**

**SA-03/05**

**Duration: 3 days**

**Prerequisite:**

This course is suitable for users familiar with the software and who have either attended SA-01 Phast training or are experienced users of the software. A good understanding of the concepts of quantitative risk assessment, consequence, dispersion and effects modelling is required, as is some experience of using this technology in the process industry.

**Description**

The course provides a comprehensive description of the discharge, dispersion, toxic and flammable effect modelling available within Phast. The course may also be customized according to the needs of the participant and can include consulting services, e.g. for resolving specific scenarios.

**Learning objectives**

Upon completion of this course, you will understand the theoretical and practical aspects of the full range of modelling capabilities available in Phast. For each area of modelling covered, you will learn about the capabilities and limitations of each model along with a detailed description of the controlling parameters. The model groups are broadly categorized as discharge, dispersion, and flammable effects.

**Target group**

Users who need to carry out detailed consequence or risk analysis in the process industries using Phast, and need to have a good understanding of the complex modelling technology available within the software. Participants are likely to be from regulatory authorities, insurance industry, or engineering contractors and consultants.



# SAFETI ADVANCED MODELLING

**Course code:**

**SA-03/06**

**Duration: 4 days**

**Prerequisite:**

This course is suitable for users familiar with the software and who have either attended SA-01 Phast or SA-02 Safeti. A good understanding of the concepts of quantitative risk assessment, consequence, dispersion and effects modelling is required, as is some experience of using this technology in the process industry.

**Description**

The course provides a comprehensive description of the discharge, dispersion, toxic, flammable effect and risk modelling available within Safeti. This course may also be customized according to the needs of the participants, and can include consulting services, e.g. for resolving specific scenarios.

**Learning objectives**

Upon completion of this course, you will understand the theoretical and practical aspects of the full range of modelling capabilities available in Phast and Safeti. For each area of modelling covered, you will learn about the capabilities and limitations of each model along with a detailed description of the controlling parameters. The model groups are broadly categorized as discharge, dispersion, flammable effects and risk.

**Target group**

Users who need to carry out detailed consequence or risk analysis in the process industries using Phast and Safeti, and need to have a good understanding of the complex modelling technology available within the software. Participants are likely to be from regulatory authorities, insurance industry, or engineering contractors and consultants.



# SAFETI FOR QUANTITATIVE RISK ASSESSMENT

**Course code: SA-07**

**Duration: 3/5 days**

**Prerequisite:**

This course is suitable for users familiar with the software and who have attended either SA-02 Safeti or are experienced users of the software. For those, the course can be delivered over three days. For less experienced participants who need to be simultaneously trained in the software, the course can be delivered over five days. A good understanding of the concept of QRA, consequence, dispersion and effects modelling is required, as is some experience of using this technology in the process industry.

**Description**

The course provides extensive guidance on how to use Safeti within the context of a Quantitative Risk Assessment (QRA). All the key aspects of the QRA process using Safeti are covered. Some of the topics included are: Hazard identification, frequency estimation and analysis, scoping QRA, building QRA model in Safeti, data collection, mitigation and reporting, failure case development and cost-benefit analyses.

In contrast to the standard Safeti training that comprehensively covers software functionality and theory, this course adopts a more practical approach to using Safeti to perform a QRA. You will be required to practise and apply your new knowledge through extensive hands-on workshops, structured around building a basic simplified QRA model.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the theoretical and practical aspects of Safeti to build a QRA model of a hazardous facility. You will learn how to identify hazards, divide these into logical isolatable sections, develop representative failure cases based on these using the 'methodical leak/rupture' approach and acquire all the background data necessary to build a QRA in Safeti.

**Target group**

Users who need to carry out QRA calculations in the process industries using Phast and Safeti. Participants are likely to be from regulatory authorities, insurance industry, or engineering contractors and consultants.





# LEAK TRAINING

**Course code: SA-08**  
**Duration: 0.5 days**

**Prerequisite:**

This course is suitable for new users and for more experienced users who have not attended a formal training course or would like a refresher course.

An understanding of the concepts of QRA and frequency analysis is required, as is some experience of using this technology in the process industry.

**Description**

This course provides an introduction to the concepts and models within Leak, DNV GL's leak frequency database application based on the UK HSE Hydrocarbon release database. All the key aspects of setting up a frequency analysis project in Leak are covered in the course.

Some of the topics included are:

- Selecting the calculation basis (hole size or release rate)
- Adding equipment items
- Determining base elements
- Defining release rate/hole size categories
- Defining output categories

You will be required to practise and apply your new knowledge of the software through a hands-on workshop.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the theoretical and practical aspects of Leak. You will learn how to assess leak frequencies for process plants using the data and analysis tools with Leak.

**Target group**

Users who need to calculate leak frequencies for releases of hazardous material on process plants. Participants are likely to be from regulatory authorities, insurance industry, engineering contractors and consultants.



# PHAST MULTI COMPONENT MODELLING EXTENSION

**Course code: SA-11**

**Duration: 1 day**

**Prerequisite:**

The course is suitable for users familiar with Phast and who have previously attended SA-01 Phast training. SA-03 /05 Phast advanced modelling would also be of benefit, but are not mandatory.

**Description**

The multi component extension allows users to simulate the release of mixtures more accurately within a range of the consequence simulation models in Phast. The course covers the capabilities and limitations of the enhanced multi-component (MC) methodology.

The multi component functionality is demonstrated, and an understanding of this methodology is enhanced by worked hand calculations. The course also highlights the application's ability to perform point property calculations and flash calculations. It also introduces methods of manual workarounds to complex modelling problems not covered by the standard functionality.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the multi component release modelling appropriately and efficiently within hazard analysis investigations and QRA studies. You will be able to create a range of multi-component mixtures and use them to generate scenarios in the MC Vessel model.

**Target group**

Experienced risk analysts with previous experience using Phast or Safeti who need to carry out simulation of the accidental release of toxic and/or flammable multi component mixtures to the atmosphere. The course does not cover Phast and Safeti usage, so it is assumed that the participants are already familiar with the software.



# SAFETI CONGESTED EXPLOSION MODELLING EXTENSION

**Course code: SA-12**

**Duration: 1 day**

**Prerequisite:**

The course is suitable for users familiar with Safeti and who have previously attended SA-02 Safeti. SA-03/06 Safeti advanced modelling and SA-13 Safeti advanced explosion modelling would also be of benefit, but are not mandatory.

**Description**

Safeti contains a new extension for modelling the risks from explosions. This new approach to explosion modelling takes account of the effects of congestion and confinement when calculating overpressure and impulse results. The new modelling allows the user to select either the Multi Energy or Baker Strehlow Tang explosion methodologies. The course describes how to use the extensive new functionality, including defining obstructed regions, buildings and associated vulnerability characteristics for a range of effect types and creating additional vulnerability sets for use when assessing exceedance criteria. It goes on to describe the extensive results assessment capabilities of the much extended risk-reporting functionality available in Safeti.

**Learning objectives**

Upon completion of this course, you will understand and be able to use the congested explosion modelling available in Safeti. The course focuses on the features available in the software and explains how to use these to build a model of your plant which includes congestion and confinement information, and building specific vulnerability characteristics.

**Target group**

Experienced risk analysts with previous experience using Safeti who need to carry out detailed risk modelling calculations involving explosions. The course does not cover Phast and Safeti usage, so it is assumed that the participants are already familiar with the software.



## SAFETI ADVANCED EXPLOSION MODELLING

**Course code: SA-13**

**Duration: 1 day**

**Prerequisite:**

The course is suitable for users who are already familiar with Safeti and have previously attended SA-01 Phast training and SA-02 Safeti training. SA-03/06 Safeti advanced modelling and SA-12 Safeti congested explosion modelling extension would also be of benefit but are not mandatory.

**Description**

Safeti's extension for modelling the risks from explosions takes account of the effects of congestion and confinement when calculating overpressure and impulse results. The extension contains both the Multi Energy and Baker Strehlow Tang explosion methodologies. The course goes into technical details about the explosion and vulnerability modelling available in the Safeti explosion extension. It describes the theory behind the Multi Energy and Baker Strehlow Tang models as implemented in Safeti and provides background information on GAME, GAMES and RIGOS projects and the Yellow book and BEVI guidance documents, and provides information on how this guidance can be applied in Safeti. This includes hands-on guidance on best practice approaches for breaking up real plant geometries into obstructed regions based on the guidance literature.

**Learning objectives**

Upon completion of this course, you will have a good understanding of the theoretical basis of the congested explosion and vulnerability modelling features available in the Safeti explosion modelling extension. It supports you in calculation of effects from explosions and the impact of different vulnerability characteristics and its impact on people, for applications such as occupied building analysis.

**Target group**

Experienced risk analysts with previous experience using Safeti who need to carry out detailed risk modelling calculations involving explosions and vulnerability modelling for occupied building analysis. The training does not cover Phast and Safeti usage, so it is assumed that the participants are already familiar with the software, including the functionality provided by the explosion risk extension.



# SAFETI OFFSHORE TRAINING

**Course code: SA-15**

**Duration: 4 days**

**Prerequisite:**

The course is suitable for new users and for users who maintain a knowledge of the purpose of process industry consequence analysis and risk analysis approaches.

## Description

Safeti Offshore is the new, world leading software tool for offshore quantitative risk analysis (QRA). This training course will give hands on experience in the software, creating an offshore unit and adding all of the elements required to perform a QRA. Beginning with building the physical structure, areas, decks and walls, you will begin to see the unit visualised in the 3D viewer of Safeti Offshore. The topsides process equipment will be added and inventory and failure frequency calculations will be performed.

The next step will use Safeti Offshores inbuilt time-saving case generation tool for systematic, automatic creation of all of your failure cases. These include creation of cases for dynamic discharge calculations which take account of success or failure of detection, blow-down and isolation systems.

Fire, smoke, and explosion calculations will be introduced and their results reviewed. The contribution of accidents to escalation, impairment and fatality will be assessed in the reporting tools. Amongst the many hundreds of thousands of possible hazardous outcomes, the fires, explosions, and smoke results can be seen in the 3D viewer. You will use the 3D environment to walk through the event with a timeline controller - with this you will understand how the event unfolds, watch the failure of walls and decks and see escalation of neighbouring containment causing fire spreading, or you may see that the safety systems were effective at mitigating the event.

## Learning objectives

Upon completion of this course, you will have a broad understanding of the capabilities of Safeti Offshore and develop competence in its application to offshore Consequence Analysis and Quantitative Risk Assessment projects.

## Target group

Safety Engineers, Risk Analysts, Process Safety Engineers, Technical Safety Engineers.



# PHAST 3D EXPLOSIONS MODELLING EXTENSION

**Course code: SA-16**

**Duration: 1 day**

**Prerequisite:**

The course is suitable for users familiar with Phast software and who have previously attended SA-01 Phast training. SA-03/05 Phast advanced modelling would also be beneficial, but not mandatory.

**Description**

Phast contains a new extension for performing more advanced consequence calculations from explosions. This new approach to explosion modelling takes account of the effects of congestion and confinement and the interactions between the dispersing cloud and these regions when calculating overpressure and impulse results.

The new modelling allows the user to select either the Multi Energy or Baker Strehlow Tang explosion methodologies.

This course describes how to use the extensive new functionality, including defining obstructed regions, viewing effect contour results, and setting options for the 3D explosion calculations.

**Learning objectives**

Upon completion of this course, you will understand the theoretical and practical aspects of the 3D explosion modelling available in Phast. This course focuses on the features available in the software and explains how to use these to build a model of the plant which includes congestion and confinement information and obtain the effect contours for overpressure and impulse effects.

**Target group**

Users with previous experience using Phast who need to carry out detailed consequence modelling calculations involving explosions. The training does not cover Phast usage and assumes delegates are already familiar with the software.



# KFX BASIC TRAINING

**Course code: SA-17**

**Duration: 3 days**

**Prerequisite:**

Basic knowledge within fluid flow and fires/combustion.

## Description

Basic training for KFX with practical tutorials including:

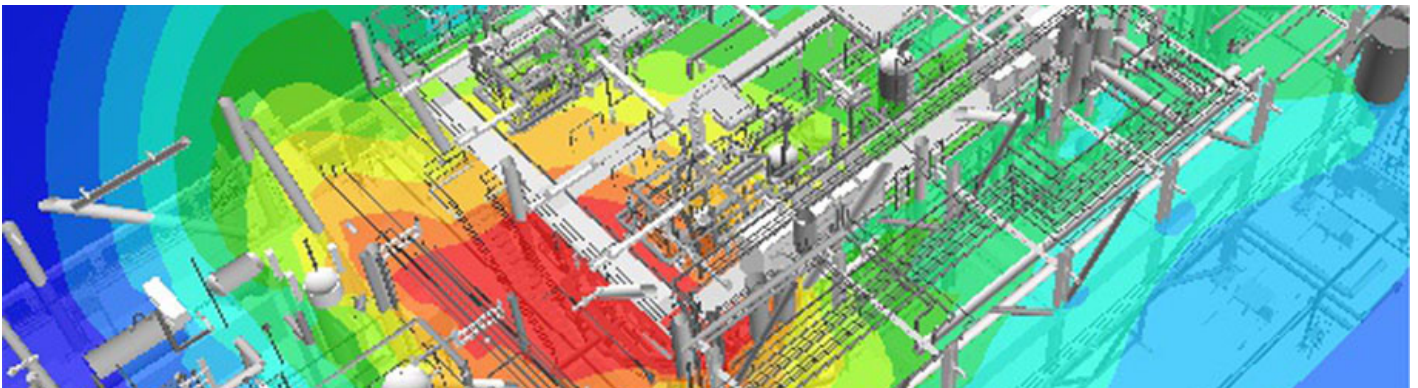
- Import of commercial CAD geometry models to KFX
- Simulation of gas jet releases, fires and dispersion
- Simulation of liquid and two phase releases and fires
- Explosions
- Fire mitigation by water systems and deluge
- Result presentation

## Learning objectives

Upon completion of this course, you will become familiar with the KFX user interface workflow. You will be able to set up and run fire, gas dispersion and explosion simulations in industrial environment. You will learn how to extract results on various formats.

## Target group

New KFX users with or without previous experience with other CFD tools.



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**DNV GL**

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**Digital Solutions**

DNV GL is the world-leading provider of digital solutions for managing risk and improving safety and asset performance for ships, pipelines, processing plants, offshore structures, electric grids, smart cities and more. Our open industry platform Veracity, cyber security and software solutions support business-critical activities across many industries, including maritime, energy and healthcare.