TRAINING PROGRAMME · INTER-COMPANY COURSE

code_aster and MFront: modelling complex mechanical behaviour

CODE_aster

DATES	DURATION	FORMAT	LEVEL	PRICE
December 2 and 9, 2027	2 days · 14 h	Remote · English	Advanced	€1,800 excl. VAT Academic €800 excl. VAT

Audience

- **Industry:** engineers and technicians with basic knowledge of the physical and numerical field covered by the course.
- **Academia:** researchers, PhD students and students from higher education and research institutions.

Prerequisites

Basic command of code_aster, good general knowledge of continuum mechanics and numerical methods, minimal knowledge of non-linear analysis.

Practical arrangements

Maximum group size: 6 participants per trainer during practical work. Inter-company course.

Registration and access time

Registration through the online form on the session page, at least 30 days before the start of the session: https://simvia.tech/services/training/code-aster-MFront_online-training-202712

Overview
(context, benefits)

Master MFront in conjunction with code_aster to develop, validate and integrate your own behaviour models, in order to simulate non-linear materials and behaviour in industrial studies.

A resolutely hands-on course: practical work built on a review of the theoretical fundamentals, with exercises of increasing difficulty, from discovery to an industrial case.

The complete workflow: the tools of the simulation chain (Salomé, code_aster, ParaView) are used together, as in a real study.

Practising trainers: our engineers and PhDs use these codes every day on industrial projects.

Close supervision: 1 trainer for a maximum of 6 trainees during practical work.

An inter-company format that encourages participants to share their experience with peers.

Objectives and targeted skills

Learning objectives, assessed during and at the end of the course. By the end of the course, participants will be able to:

- Write a non-linear constitutive law in MFront.
- Validate a law at material point level with MTest, under monotonic and cyclic loading.
- Compile an MFront law and use it in a code_aster finite element analysis.
- Account for external state variables (temperature, environment) in the law.

Course content

DAY 1 · MORNING **Introduction to MFront and non-linear behaviour**

- The MFront / MGIS / code_aster ecosystem
- Plasticity, viscoplasticity, damage, internal variables
- Structure of an MFront file and automatic code generation

DAY 1 · AFTERNOON **First implementations and validation with MTest**

- The StandardElastoViscoPlasticity brick and material-point tests
- Practical 1: cyclic test · Practical 2: implementing an elastoplastic law

DAY 2 · MORNING **Integrating an MFront behaviour into code_aster**

- MFront ↔ MGIS ↔ code_aster coupling, compilation and loading
- Configuring the non-linear solver
- Practical 3: finite element tensile test with elasto-viscoplastic behaviour

DAY 2 · AFTERNOON **Command variables and multiphysics coupling**

- Temperature, irradiation, environmental variables
- Passing information between code_aster and MFront
- Practical 4: tensile test with environmental dependency

Teaching methods

Remote course in a virtual classroom, in English.

Active teaching alternating theory and hands-on practical work on the participant's own computer, with exercises of increasing difficulty.

Resources: virtual classroom with screen sharing, course materials given to each participant, remote assistance from the trainer during practical work.

Pre-course call to understand participants' needs; end-of-day review (feedback and adjustments); immediate satisfaction survey at the end of the course.

Supervision

Simvia adapts each course to the actual needs of the trainees. Sessions rely on active teaching, with practical and personalised exercises that anchor learning in real time.

Theory sessions alternate with supervised practical work.

Equipment

Computer with an internet connection, microphone and speakers or headset; software installed before the session (installation help is provided).

Duration

Total duration: 2 days, i.e. 14 hours.
Schedule: 9:00 am – 12:30 pm and 1:30 pm – 5:00 pm.

Dates

December 2 and 9, 2027 (two days one week apart)

Location

Remote course in a virtual classroom, inter-company format. The connection link is sent with the joining instructions.

Price per participant

Company: €1,800 excl. VAT per participant.
Academic: €800 excl. VAT per participant.
Included: help with installing the latest version of the software, training completion certificate.

French companies may have the course covered by their OPCO (French skills operator) under the skills development plan. Not eligible for CPF (French personal training account).

Accessibility	Simvia is committed to making its courses accessible to people with disabilities; our premises are accessible to people with reduced mobility. Our trainers adapt their teaching methods to each situation. For any specific need, please contact our disability officer: oumaima.nassif@simvia.tech.
Course manager, contact	**Teaching manager:** Florian Hermet, florian.hermet@simvia.tech **Administrative and disability officer:** Oumaima Nassif, oumaima.nassif@simvia.tech **General contact:** training@simvia.tech
Trainers	**Basile Marchand** PhD in computational mechanics, computational mechanics tech lead Practising code_aster trainer at Simvia, working daily on industrial projects. If unavailable, a trainer with equivalent expertise is appointed and confirmed in the joining instructions.
Attendance and certificate	Attendance sheet signed by trainees and trainer for each half-day. Training completion certificate issued upon passing the final assessment.
Assessment	Formative assessment at the end of day 1 (checking what has been learned that day). Summative assessment at the end of day 2 (validating learning across the whole course). Immediate satisfaction survey at the end of the course. Delayed assessment 2 months after the course, for the trainee and the company.
Going further	Simvia offers specialisation modules and a technical support service to deepen and extend skills development. Full catalogue: https://simvia.tech/services/training/catalog