## CODES

### Alya
Developer: BSC

Application Area: Multiphysics, Aerospace, Automotive, Marine

Linked Companies: Idiada, EM Combustion, iVascular, IHT, Seat, Repsol, Iberdrola, Medtronic, Siemens AG, General Electric

### AVBP
Developer: CERFACS

Application Area: Aerospace, Automotive, Combustion, Compressible Two-Phases Flows

Linked Companies: SAFRAN Group, TOTAL, CNES, Ariane Groupe

### Coda
Developer: DLR

Application Area: Aerospace

Linked Companies: Airbus

### FeniCS
Developer: CINECA

Application Area: Multiphysics, Aerospace, Automotive, Energy, Renewables

### TPLS
Developer:
School of Engineering at The University of Edinburgh and of the School of Mathematical Sciences, University College Dublin

Application Area: Parallel sustainability - Mathematical modelling of complex fluid flows

### NEK5000
Developer: KTH

Application Area: Aerospace, Automotive, Energy, Renewables
Linked Companies: Scania, Tetra Pak, Agusta Westland

## PARTNERS



**The European Centre of Excellence for Engineering Applications**



## www.excellerat.eu
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## What is EXCELLERAT?

The EXCELLERAT Center of Excellence bundles knowledge on HPC in engineering and offers service solutions for industry and research. One focus of EXCELLERAT lies on engineering solutions for aeronautics and the automotive sector. It caters for the need to provide the necessary knowledge, computational power and infrastructure to tackle the ever rising complexity of scientific and development endeavors alike.

## What is the goal?

EXCELLERAT wants to bring together key players from industry, research and HPC and provide services to advance the European engineering market towards Exascale computing. Exascale is able to address computationally highly complex and costly problems and allows to gain insight into the potential of technological solutions already at the development stage.

## How can Excellerat provide the benefits of high-performance computing (HPC) to the engineering industry?

By providing knowledge and expertise with our strong consortium of key players in European HPC, we can advance scientific progress and drive product innovation through the use of large scale simulation and modelling, high performance Data Analytics (HPDA), the application of Artificial Intelligence (AI) solutions.

## SERVICE OFFERINGS

In a holistic approach, EXCELLERAT analyses and optimises six core codes according to the engineering lifecycle.
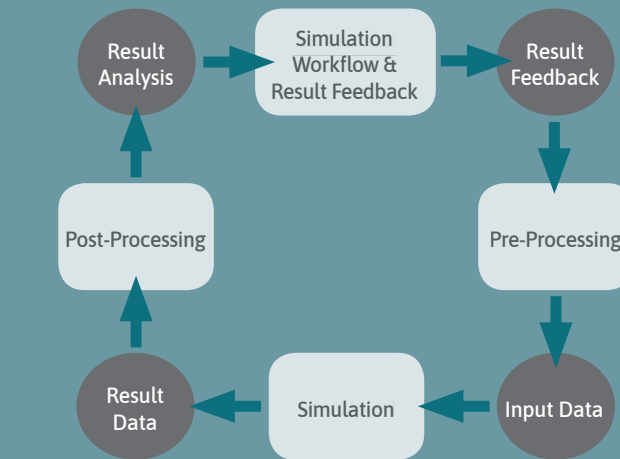
- Code Optimization
- Training
- Tools for HPDA and KI in Engineering Workflows
- Data Management from Customer to Solution
- Networking
- Co-Design
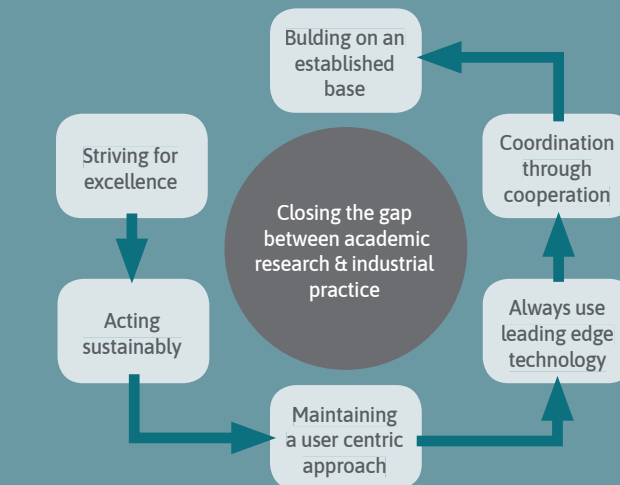
## USE CASES

### Alya
Emission prediction of internal combustion (IC) and gas turbine (GT) engines. Active flow control of aircraft aerodynamics including synthetic jet actuators. Coupled simulation of fluid and structure mechanics for fatigue and fracture.

### AVBP
Combustion instabilities and emission prediction. Explosion in confined spaces.

### Coda
Design process and simulation of full equipped aero planes. CFD coupling with computational structural mechanics including elastic effects.

### FeniCS
Adjoint optimization in external aerodynamics shape optimization.

### TPLS
Flow modelling like oil and gas flows in long-distance pipelines or refinery distillation columns, liquid cooling of micro-electronic devices, carbon capture and cleaning processes, water treatment plants, blood flows in arteries, and enzyme interactions.

### NEK5000
Wing with three-dimensional wing tip. High fidelity simulation of rotating parts.