

EDA EUDETCODE – EDA EUROPEAN DETONATION CODE

The European defence community has identified a need for a computational capability, which can predict accurately the performance of high explosives and propellants. The project aims at the development of a European Detonation Code, the development of techniques for preparing input data including a database and selection and use of techniques for verification and validation of the code. It will exchange and consolidate knowledge of energetic material simulations required for the development of future munitions and missiles, therefore strengthening the European defence capability.

Objectives

The contributing members of the project have identified a need for a computational capability, which can predict accurately the performance of high explosives and propellants. Such a code, sometimes referred to as detonation code, is routinely used today in design and assessment of warheads, propulsion and launch systems and in the field of internal ballistics. It is also a valuable tool in fundamental studies of energetic materials as well as other explosives applications such as rock blasting. Currently there is fragmented knowledge and expertise in Europe concerning high explosives performance and its modelling and simulation. Different European countries use various detonation codes, which cover only partially the needs of European researchers and industry.

The Project will exchange and consolidate knowledge of energetic material simulations required for the development of future munitions and missiles, strengthening the European defence capability. Furthermore, a software tool will be developed to accurately predict the performance of energetic materials and relevant experimental testing will be performed for its verification.

The goal of this project is thus to bring forth a unified code, which is improved through continuous work on new models and experiments for calibration and validation. Furthermore, a broad spectrum of energetic materials will be included, demanding special attention to properties that are challenging from a modelling perspective, e.g. non-ideality and kinetic effects, low-density compositions, energetic salts etc. Such a unified expertise in this field is welcomed, needed and will be a long-term advantage for Europe. A common platform would support the European defence and industrial base on energetic materials competitiveness and further enhance cooperation among EU Member States.

The project is scheduled for 5 years and will involve research groups, academia and industry from the contributing members. It is well suited for a fruitful collaboration as varying fields of expertise are present among contributing members and a unified expertise is required for further strengthening the European competitiveness and strategic autonomy in the field of Missiles and Munitions.

Work Strands

The project is structured in 8 Work packages:

- WP 100 – Project Management
- WP 200 – Scientific Review and Challenges

Prepare the pathway to the definition of the thermochemical model of the code by bibliographic study collecting information on models and algorithms, identify gaps and needs for code implementation, define requirements of the new detonation code and of the governing equations and equations of state, specify validation tests.

- WP 300 – Common Database

Define the properties to be considered, the data format and the way how data is structured and implemented in a database

- WP 400 – Programming and Code Assembly

Development of code consisting of the following basic modules: Solver, Equations of state for explosive products and propellants, Communication procedure with the main code

Participating Members



Consortia/Organization



- WP 500 – Generation of Input Data
Search for experimental and theoretical methods to generate input parameters, not available in literature.
Demonstration of theoretical calculations and of experimental techniques on selected species.
- WP 600 – New Models, Methods and Phenomena
Expand the analysis of identified new models that are not considered standard features in a thermochemical code
- WP 700 – Experimental Test and Validation
Experimental techniques generating data for verification and validation of the new code
- WP 800 – EuDetCode Long-term Strategy and Roadmap

Way Ahead

WP800 will develop a roadmap for code maintenance, licensing and distribution along with routines and clear responsibilities for post-project development, where the code is updated continuously to ensure long-term viability and growth.

Link to TBBs

- OSRA TBB 10: Munition Life Management;
- OSRA TBB 16: Improved tools and methods for qualification and safety.

