

ADVISE brings together leading experts and key stakeholders with long-term commitments to this subject, covering construction, operation, and all aspects of in-service inspection.

They will collaborate for new nuclear power constructions, maintenance of ageing power stations and safe operation of plants at end of life, addressing both Western European and Russian designs.

Project partners

1. Électricité de France (France) – *Andreas Schumm*
2. Imperial College London (UK) – *Michael Lowe*
3. Fraunhofer Institute for Non-destructive Testing (Germany) – *Martin Spies*
4. Commissariat à l'énergie atomique et aux énergies alternatives (France) – *Pierre Calmon*
5. ARTTIC (France) – *Andrea Kuperberg*
6. University of Bristol (UK) – *Bruce Drinkwater*
7. M2M (France) – *Philippe Benoist*
8. Bay Zoltán Nonprofit Ltd. for Applied Research (Hungary) – *Szabolcs Szávai*
9. Kaunas University of Technology (Lithuania) – *Liudas Mažeika*
10. EXTENDE (France) – *Souad Bannouf*
11. Materials Testing Institute - University of Stuttgart (Germany) – *Martin Werz*
12. Intercontrôle (France) – *Yann Kernin*
13. ÚJV Řež (Czech Republic) – *Ladislav Horáček*

ADVISE AT A GLANCE

ADVISE aims to enhance – and in some cases to enable for the first time – the ultrasonic inspection of complex structured materials for which conventional ultrasonic techniques suffer from severe performance limitations due to the micro and/or macro-structure, in order to improve confidence in and reliability of the inspection of Generation II and III reactors.

Starting date: September 1, 2017

Term: 4 years

Coordinator: Electricité de France (Andreas SCHUMM)

Partners: Leading experts and key stakeholders covering construction, operation, and all aspects of in-service inspection

Expected results: The delivery of a set of techniques and methods, documented capabilities for the identified classes of inspection problems, demonstrators on industrially relevant example cases and dedicated software tools to improve and maintain power plants safety and reliability

Budget: A total of 4.55 M€ and a funding support of 4.17 M€ from the European Commission's EURATOM programme under the Horizon 2020 framework programme for Research and Innovation



ADVISE

ADVANCED INSPECTION OF COMPLEX STRUCTURES

www.advise-h2020.eu



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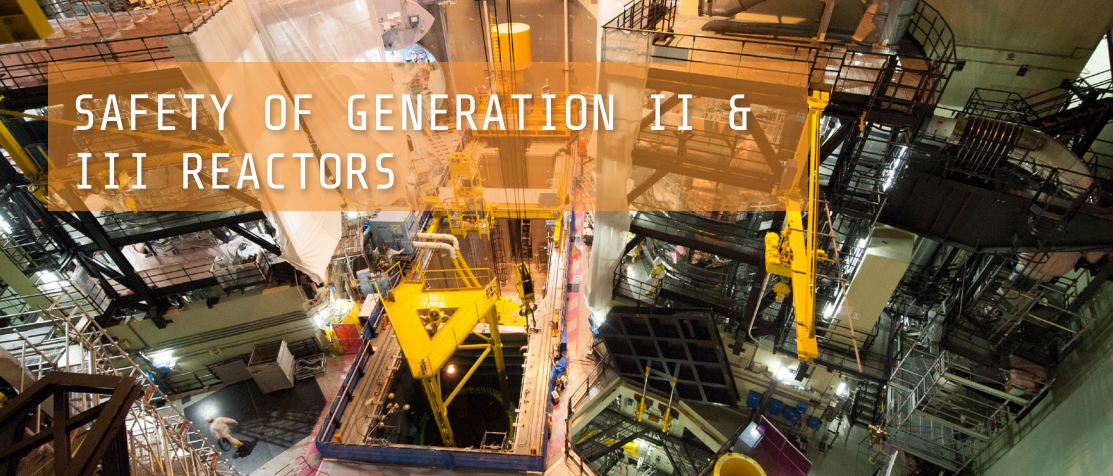


This project has received funding from the EURATOM Research and Training Programme 2014-2018 under Grant Agreement No 755500.



ADVISE has received the NUGENIA label from the Nuclear Generation II & III Association

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SAFETY OF GENERATION II & III REACTORS

WHY THE ADVISE PROGRAMME?

In recent years, there has been increasing concern for safe long-term operation of existing European nuclear power plants. The ultrasonic inspection of corrosion resistant alloys used in these plants – in particular claddings, austenitic welds and cast austenitic steels – is a long standing issue in the field of **nuclear non-destructive testing and evaluation** (NDT and NDE). For these materials, a complex microstructure is responsible for both structural noise and attenuation, thus degrading the performance of ultrasonic non-destructive testing.

At the same time plant owners wish to replace radiographic **inspections by ultrasound as a less disruptive, safer and faster technique.**

To address these issues and thereby keep on improving safety and reliability of Generation II and III reactors, there are still a number of technical breakthroughs to overcome, including the need to **improve NDE techniques for complex structured material.**



WHAT ARE ADVISE'S OBJECTIVES?

The main objective of ADVISE is to enable the ultrasonic inspection of complex structured materials so as to improve confidence in inspection of Generation II and III European reactors.

ADVISE will enable:

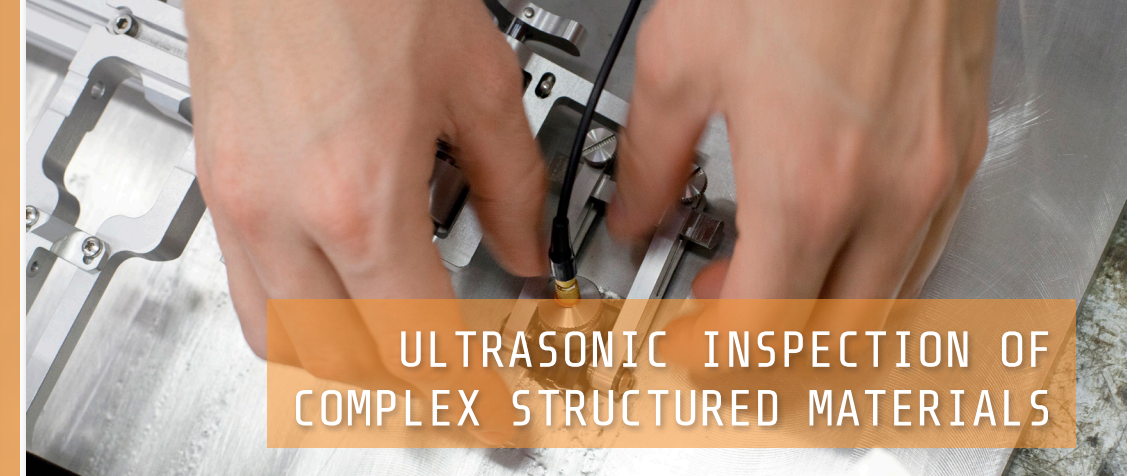
- The optimisation of the performance of existing ultrasonic inspections, where better signal-to-noise ratio, deeper penetration depth and more reliable diagnostics are required, and
- The application of ultrasound to cases where it cannot be applied today and where the industry currently must resort to radiography, which is highly disruptive and has certain imminent dangers due to the radiation used.



WHAT IS ADVISE'S STRATEGY?

The project relies on a multi-pronged strategy:

- Model-assisted inspection enhancement tools allow the iterative optimisation of customised transducers and associated excitation signals, to specify the most appropriate inspection approach.
- Novel in-situ characterisation techniques acquire specific information about the structure to be inspected; then model-assisted optimisation tools fine-tune the inspection parameters in the field.
- Model-assisted diagnostic tools take a-priori, model-predicted and in-situ obtained information into account to fully exploit the information contained in full matrix capture (FMC) acquisitions, using adaptive imaging methods, backscatter filtering and inversion strategies.



ULTRASONIC INSPECTION OF COMPLEX STRUCTURED MATERIALS



WHAT ARE ADVISE'S EXPECTED RESULTS?

The main output of the project is a step change improvement in performance in terms of inspectable depth, defect detection and characterisation accuracy:

- **Increase of the inspectable depth** of 70 to 85 mm for austeno-ferritic cast components.
- The **in-situ characterisation for specific inspections** will provide the confidence needed to make safe decisions from measured indications without the significant conservatism that is needed in many cases currently.

The CIVA platform and the M2M acquisition systems are the natural receptacles of the project results. The CIVA software will be enriched with new functionalities issued by the project. Simulation codes developed by the partners will be connected in the platform. The ADVISE imaging and diagnostic tools suitable to online applications will be integrated in the M2M portable acquisition system while those relevant to offline applications will be connected to the CIVA analysis framework.