

## DB-HERITAGE – Data Base of Building Materials with Architectural Heritage and Historic Importance

### Summary

Conservation and restoration interventions on cultural property, particularly in the context of historical and architectural heritage, always begin with a survey of the constituent materials (e.g. stone, mortars, concretes, paints, ceramics, metals, wood) and of their conservation state, in order to provide recommendations on the intervention plan and on the materials and the techniques to be used.

LNEC has been coordinating a considerable number of projects not only related with the historical and technical survey of construction and on their long-term performance, but also on the techniques and interventions. Therefore, LNEC has an unparalleled collection of information on physical, chemical and mechanical characterization of materials and on their forms of decay and conservation needs.

This is the context of DB-HERITAGE project, intended to build a reference sample collection or repository for historical materials and an IT-tool to collect the related data on construction materials history, properties, and performance. Documenting and preserving materials data is important both to fulfil researcher's needs and to obtain social benefits concerning the related educational and historical value. The samples repository is also demanded as a basis for further understanding, innovation and development, besides the preservation of the materials historical value and information. The dissemination of those materials' identity and importance to non-specialized interested publics may also be enhanced by a data base.

The project uses the previously developed free tool (DURATINET / DB-DURATI), related with assessment and mitigation of deterioration and performance of construction materials used on the built environment. The development of free access web-based applications, making use of the full potential of information and communication technologies, is aligned with the European smart growth priority. The improved IT-tools, which are essential to effectively manage data, should provide for systematization, upgraded access and efficient retrieval. The database is developed to categorize materials by type and function and should be also further improved to provide a customized interface with the user addressing the relevant issues in the historical context of construction materials. These include origin, use, chronology of interventions, properties, environmental exposure conditions, result of observations, and archive management details. The basic requirements for this package include facilities, proper equipment, human and material resources. Materials samples require specific protection from external environmental factors.

Thus, the built facility, which includes a storage area, a work area for organizing and processing, and a public room for public assessment, has the ability to provide protection from outdoors exposure and from damage during use. The adopted and improved tools, built facility and improved knowledge are used to establish a cluster on materials history. Some case studies are used (Figure 1).

The advantages of setting up such a platform to deal with historical materials past and future performance are massive. The project results, prepared tools and collected data will be exploited, shared and made entirely available. Efficiently and systematically organized materials and related information, properly collected and preserved, are valuable for research to prolong historic building materials life both by delaying deterioration and supporting their suitable selection and use. The project is included in IPERION-CH.pt research infrastructure goals, inscribed on the Portuguese National Road Map of Strategic Interest Research Infrastructures, expanding the xylarium existing at LNEC to most other building materials. The social, environmental and economic related benefits are being highlighted by the communication strategy of the project. From a scientific point of view, in addition to better understanding of the historic building materials constituents and characteristics, DB-HERITAGE project allows developing more efficient ways of using materials and methods for their conservation and restoration.



Figure 1. Part of DB-Heritage team in a meeting and visit to Palmela Castle in June 2017.

The results include:

- A bank of samples and data for study and consultation.
- Compiled information about the building materials used in Portugal over time.



### Project Reference

PTDC/EPH-PAT/4684/2014

### Leading Institution

LNEC – National Laboratory for Civil Engineering (Portugal)

### Partners

Nova University of Lisbon (Portugal), University of Aveiro (Portugal), University of Évora (Portugal)

### CERIS Principal Investigator

Paulina Faria  
([paulina.faria@fct.unl.pt](mailto:paulina.faria@fct.unl.pt))

### CERIS Research Team

Teresa Freire

### Funding

FCT – Fundação para a Ciência e a Tecnologia

### Period

2016-2019

### Total

199 968.00€

### CERIS

-

### Project Website

[db-heritage.lnec.pt](http://db-heritage.lnec.pt)

- Description of the state of degradation of the building materials, considering the time, the materials type and its characteristics and environmental exposure, if applicable.

The objectives delineated for this Project involve four themes of research:

**Theme 1 – General information on Portuguese building construction materials history, properties and performance.** In the last decades there has been increasing global information on building materials composition and characteristics, as well on their deterioration and ageing mechanisms. The compilation of such information is of the utmost importance due to researcher's needs, historic value and the legacy for future generations. Social and economic aspects are also favoured, namely by the improved awareness of the populations for their built heritage, enhancing biggest attraction by the so-called cultural heritage tourism. This also favours the local employment, particularly in areas related to the use of traditional arts and materials, and contributing to the fixing of populations in more inner parts of the country. The main objective is to collect information on building construction materials in Portugal, namely in the aspects related with the constituents, production technologies and main raw materials sources. For the accomplishment of this objective, the compilation of data already available on partner's institutions, accompanied by the research on papers, thesis, books and site references in all the country is being carried out. The results of this research are being imputed on the electronic database, in order to be shared and made entirely available. This work is also allowing to obtain information on the performance of building materials in different contexts, namely in terms of their exposition, and whenever possible on conservation materials and practices.

**Theme 2 – Collection and characterization of historic building material samples**

The collection of samples already available in the different partners (e.g. xylarium existing at LNEC, historic paintings sample collection at HERCULES Lab), including scattered material that exists in the LNEC and which will now be all

reunited, will be systematized and complemented with samples collected but not characterized, and also from selected new case studies. These data will be computed in order to give information on material and constituents type, function, localization, exposition to particular environment, historic period, type of building, composition, physical and mechanical characteristics, etc. The results obtained will allow educational and scientific improvements on different disciplines related with cultural and architectural heritage preservation.

**Theme 3 – Collection of physical samples of historic building materials**

The members of the project are supplying samples of historic building materials for the creation of a physical archive. These samples will be properly accommodated and classified, with a short synthesis of the information obtained during the sampling and on its main characteristics (Themes 1 and 2), and can be supplied for external institutions for further studies and comparisons. It is expected a substantial enlargement of the number of samples with different specimens from public and private entities, including samples extracted from new case studies during the project duration. A built facility has been created on LNEC to collect these samples, which will include a storage area, a work area for organizing and processing, and a public area for public assessment.

**Theme 4 – Database tool on Portuguese historic building materials**

The results obtained in Themes 1 to 3 will lead to creation of a free access web-based application, making use of the potential of information and communication technologies. It is expected that this tool will use the already available information obtained in the project FCT IMPROVE and the Atlantic Area DURATINET project, both related to the characterization and performance of building materials.

There are workgroups on the following materials: Stones, Earth, Mortars, Ceramics, Metals, Concrete, Wood, Paintings and can be accessed at [http://db-heritage.lnec.pt/index\\_en.html](http://db-heritage.lnec.pt/index_en.html).