

The Portland cement industry and reinforced concrete in Portugal, 1860–1945

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ABSTRACT: This text aims to analyse the transformation of the image and identity of Portland cement and reinforced concrete in Portugal from the 1860s up to the end of the Second World War, as portrayed in the press. The dissemination of the material and the building system sometimes followed parallel and sometimes overlapping paths. In both cases, the purposes, limitations, advantages and disadvantages of the material and the process alike were discussed in the different media and by the range of stakeholders. Rhetoric, marketing and propaganda were carefully fashioned by combining scientific study, statistical data, graphics with slogans and photographs – along with other aspects such as the social benefits and guarantees for cement factory employees – to depict Portland cement in its different applications to a range of audiences. Sources included not only all the main specialized journals, patent records and daily newspapers but also monographs sponsored by cement factories, contractors and the State itself to promote their own corporate identity, vision, mission and culture.

1 INTRODUCTION

Retracing the development of contemporary building cultures in Portugal is a complex task that involves the interrelated analysis of different types of historical evidence. The present text intends to discuss some provisional findings of the ongoing research project “From Lime to Portland Cement: Construction History and Building Cultures in Contemporary Portugal” funded by the Portuguese Foundation for Science and Technology (FCT) and developed at the Faculty of Architecture, University of Lisbon (Mascarenhas Mateus 2016). This analysis does not pretend to be exhaustive, given the extensive information gathered to date. Nevertheless, the trends described are considered by the authors to be essential to the study of the implementation of the new building culture of reinforced concrete in Portugal. Due to paper length restrictions, the main findings and conclusions are presented in summary form as far as is possible.

Taking some inspiration from Thomas Kuhn’s theory of progress cycles (Kuhn 1962), the paradigm shift from a lime, earth and wood building culture to one revolving around reinforced concrete took a long time to happen worldwide. This shift was accompanied by a pre-scientific period and a shorter period of broader scientific knowledge. Since Antiquity, concrete based on aerial or natural hydraulic

lime, sand and coarse aggregates, sometimes combined with pozzolanic additives, was used for foundations, hydraulic works and all kinds of superstructures such as the well-known monumental Roman vaults. Nevertheless, the first step in the ‘reinforced concrete revolution’ was triggered by the introduction of new schools of thought on the production of natural and artificial binders at a time when iron and steel was becoming a standardized construction material. Improvements to hydraulic limes and natural/Roman cements (with pre-scientific studies including those produced by Antoine-Joseph Lorient (1716–1782) or James Parker in the second half of the eighteenth century and normal science studies by Louis Vicat (1786–1861) during the first half of the nineteenth century) were followed by a new series of material science improvements in the fields of geology and chemistry on ‘artificial stones’ and the production of the artificial binder known as Portland cement, patented by Joseph Aspdin (1778–1855) in 1824. This was a new material whose production was, as early as 1876, standardized in Germany with the adoption of the ‘Standard rules for furnishing and testing Portland cement’ set out by the Association of German Portland Cement Manufacturers. Meanwhile, the Bessemer process for the mass production of steel registered in the 1850s and the elastic theory established by authors such as James Bernoulli (1655–1705), Charles-Augustin de Coulomb (1736–1806), Leonhard Euler (1707–1783), Claude