

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

An assessment of the potential for Building Information Modelling (BIM) in the construction of Large Nuclear Power Plants

This paper is an investigation into whether the use of Building Information Modelling (BIM) on a Large Nuclear Power Plant (LNPP) yields process efficiency. The successful nuclear programs of the past such as the French Pressurized Water Reactor (PWR) programme relied on learning from one LNPP construction project to the next to improve construction efficiency. However, Nuclear Reactors have steadily increased in size since the 1970s and are now so huge, complex and expensive that some have questioned whether recent cost and schedule over-runs such as those at Flamanville FA3 are intrinsic to the technology itself.

Against this backdrop, recent debate in the UK has focused on the role for Small Modular Reactors (SMR) which, by nature of their smaller size, would recapture benefits associated with standardisation and large production runs. The use of BIM is well understood for most construction projects. However, there is little research into the benefits for nuclear power plant construction and none which focuses on the UK context. Although this paper doesn't measure the benefits or otherwise of using BIM in SMR construction, through examining the benefits to LNPP construction conclusions can be drawn about the relative merits of building a new fleet of LNPP or SMR in the UK.

A case study methodology has been adopted to carry out a mixed methods investigation into the use of BIM during construction of the Civil Engineering scope at Hinkley Point C (HPC) power station. The aim is to investigate the benefits of the use of BIM during the construction of the power station, to consider whether these benefits are different from those for other construction projects and to understand the role of BIM in transferring knowledge between one project and the next. Comparisons with non-BIM enabled (but similar) power station construction projects such as Flamanville FA3 and Olkiluoto 3 power stations are also carried out.

350 delivery organisation personnel were surveyed and 7 industry leaders interviewed between 1st July and 20th September 2018 all of whom were actively involved in the construction of HPC power station. Users rated visualisation of the works as the most important benefit from the use of BIM tools in contrast to the literature where Cost or Schedule was the most often quoted benefit. The results also suggest that through this benefit, the need to employ previously experienced personnel on LNPPs is reduced, thus calling into question one of the key benefits to the adoption of SMR technology: that production efficiency would be greater than that on LNPP due to learning from building multiple small reactors one after another.

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